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SURVEY OF THE INTERLIBRARY LOAN OPERATION OF THE NATIONAL LIBRARY OF MEDICINE



APRIL 1962

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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by
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Reference Services Division

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Foreword

I should like to acknowledge the guidance and counsel received during the course of the present survey of the interlibrary loan operation from the Director of the National Library of Medicine, Dr. Frank B. Rogers, whose vision and initiative have brought this important service of the NLM to fruition.

I also wish to mention the contribution of many persons in the Reference Services Division without whose support the survey could not have been accomplished; finally, I wish to record my appreciation to Mr. William Wiedman of the Circulation Section, Reference Services Division, for his contribution to this report. The responsibility for the data, its presentation, and interpretation, however, is fully my own.

The survey covers a large area; in fact, a sizable task has been to shape the data within reasonable bounds. This has not been an easy requirement, for it seemed that each finding inevitably opened up possibility of further purposeful development. However, a reasonable establishment of a limit or boundary had to be set, and the additional inviting analysis deferred.

WILLIAM H. KURTH.

APRIL 1962.

Preface

"Their doors are open freely to all who are able to use their resources for the advancement of science or learning."

* * *

This paper reports a survey of the interlibrary loan operations at the National Library of Medicine.

The operations discussed here represent a significant departure from conventional interlibrary loan routines. The substance of the present report pertains to the handling of interlibrary loans through the instrumentality of photoduplication. This concept—providing photoduplicates of desired materials in lieu of loaning the originals—stems from thinking enunciated by Atherton Seidell, a member of the Friends of the Army Medical Library who pioneered in the development of photoduplication services. The concept can no better be stated than by direct quotation from Seidell's writings:

Practically all great reference libraries are maintained largely at public expense or by endowments which have been collected for educational or cultural purposes. Their doors are open freely to all who are able to use their resources for the advancement of science or learning. A reader in one of these libraries is provided usually with a comfortable working place and he is waited upon by a corps of highly trained employees who place at his disposal as many books and as much reference material as may be desired. . . . There is no charge whatever and in only rare cases is any attempt made to estimate the cost of this part of library operation. . . .

The question now arising in connection with microfilm copying is whether this should be considered in the same light as other services freely rendered by libraries or as something different for which a charge should be collected. . . . A question . . . for librarians to consider is whether the published reports in their periodical collections can be more efficiently and economically distributed to the many who are able to use them, by means of microfilms rather than by placing the books themselves at the disposal of the relatively few who can come to the library to consult them.¹

It is also important to consider whether or not microfilm copying can be organized in such a manner that its cost will be no greater and possibly less than that required for lending books and maintaining the equipment and service necessary for library readers. . . . In conclusion the suggestion is made that publicly supported reference libraries eventually should perform microfilm copying . . . as freely as they now make interlibrary or other loans

The present report is essentially a recitation of the application and result of this concept of interlibrary loan, with descriptive and interpretive detail.

¹ Seidell, Atherton. "The place of microfilm copying in library organization." *Science*, vol. 94, p. 115, Aug. 1, 1941.

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I

The Interlibrary Loan Operation

CHARACTERISTICS, MAGNITUDE, TRENDS

The interlibrary loan service of the National Library of Medicine provides massive support to the resources of the medical and scientific library community both in the United States and abroad. From September 1957—the beginning of the present interlibrary loan policy—through June 1961 a total of 325,262 interlibrary loans were transacted. Yet, this interlibrary loan operation was accomplished, in very large measure, without the original publications having left the Library.

This is explained by the fact that photoduplicates of the desired publications (or, more precisely, the desired articles included therein) are produced in response to the loan requests, the photoduplicates being prepared by microfilming the articles from the original publications, following which “hard copy” is prepared by a xerographic process.¹

The interlibrary loans transacted during this period (325,262) comprise 301,528 loans satisfied by the use of photocopy, with the remaining 23,734 loans involving original materials.

The 301,528 loans cover a period of almost 4 years and the individual year totals have increased sharply and successively during that period.

Both the disproportionate relationship between the loans satisfied by photocopy and those handled by loan of original material, and

the increasing year-by-year magnitude of the interlibrary loan operation, are set forth in the following table.

TABLE 1.—*Interlibrary loans completed, fiscal years 1958-61*

Fiscal year	Original loans	Photocopy loans	Total loans
1958-----	4, 303	43, 378	47, 681
1959-----	5, 659	67, 069	72, 728
1960-----	6, 977	88, 618	95, 595
1961-----	6, 795	102, 463	109, 258
Total-----	23, 734	301, 528	325, 262

Source: *Annual Reports*, NLM; the fiscal year covers the period from July through June of the following calendar year; however, the figures for fiscal year 1958 cover only the 10-month period, from September 1957, when the new loan policy became operative, through June 1958.

Thus, some 93 percent of the completed interlibrary loans related to photocopy loans, with only the remaining 7 percent concerning original materials. Also, it is approximately correct to state that the 93 percent of all completed loans furnished in photocopy may be equated with loans directed to serial publications, and the loans of original publications similarly equated to monographs.

The rate of growth in the loan operation is depicted more sensitively when the month-by-month data are plotted. Figure 1 illustrates the monthly total of interlibrary loan requests received, and indicates, in addition, a 9-month moving average which furnishes a trend line for the period covered (September 1957 through June 1961) and serves to iron out the monthly fluctuations.

The experience during this period indicates that for every 100 interlibrary loan requests

¹ It should be noted that the interlibrary loan operation involving photocopy is reduced to an operation which is transacted *qua* article rather than in terms of the complete bound volume containing that article. Through the instrumentality of photoduplication, the precise material is made available on loan, avoiding thereby the transmittal on loan of original material which would be irrelevant for the purpose of the borrowing library to have, and impracticable for the lending library to make available.

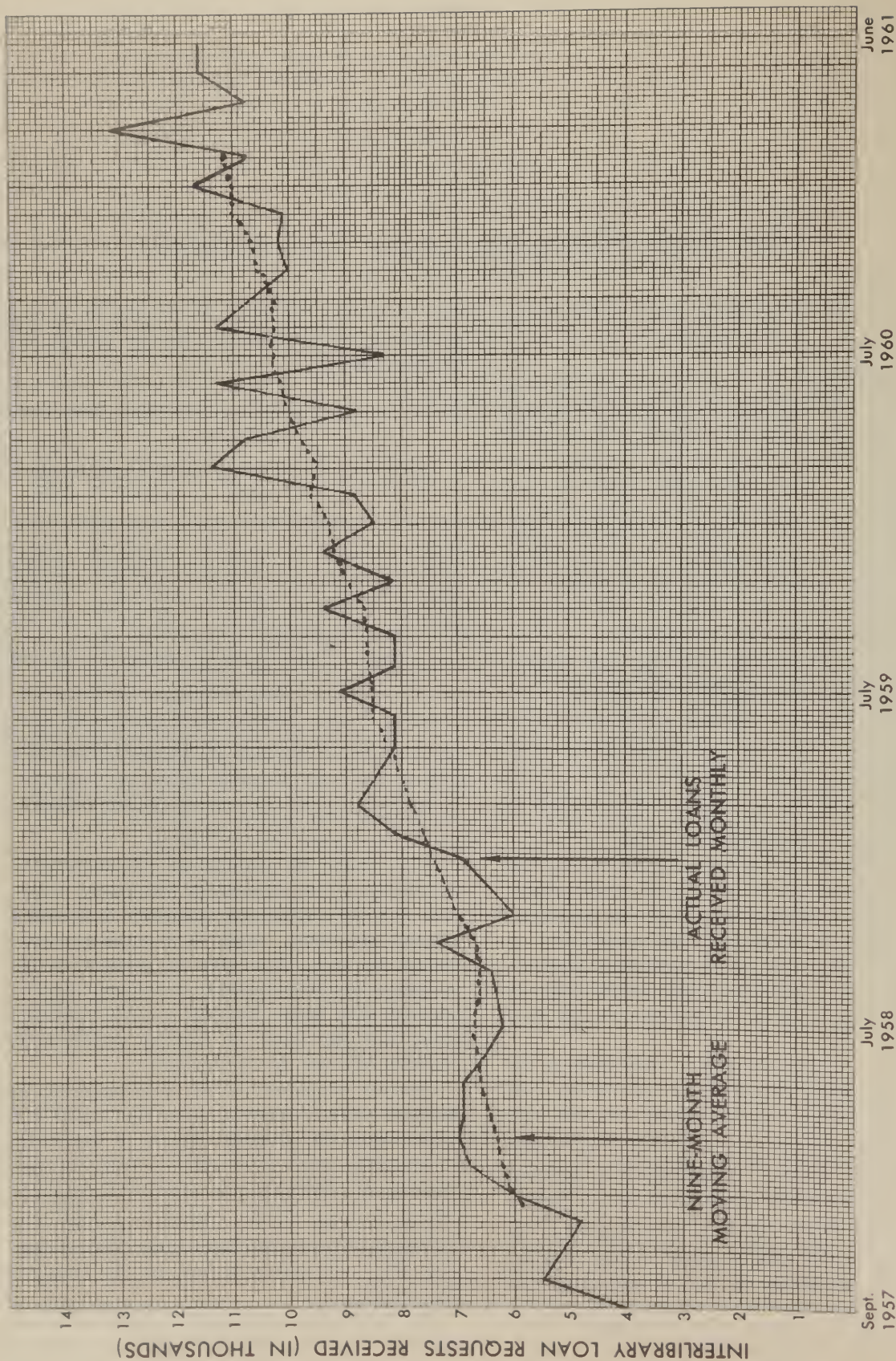


FIGURE 1. Interlibrary loan requests received September 1957-June 1961.

Requests received are exhibited on a month-by-month basis; the dotted line is a nine-month moving average to picture trend.

received the following proportions held: interlibrary loans satisfied by photocopy, 78; original loans, 6; unfilled loans, 16. This is indicated visually in figure 2.

ANTECEDENTS OF THE PRESENT INTERLIBRARY LOAN POLICY

The 301,528 interlibrary loans transacted in the form of photocopy represent the aggregate of loans handled in this form since the inauguration of NLM's new loan policy, in September 1957, through June 1961.

The previous policy may be examined profitably at this juncture to provide the historical background of the events leading to the new policy.²

Some 23 years ago the NLM began the development of a photoduplication service as an adjunct to its other services; by 1956 the Library was filling about 85,000 orders annually. The photocopies were furnished to individuals and to libraries alike at a small charge; the interlibrary loans of original materials were furnished to libraries, which sustained the carriage charges in both directions.

The passage of the National Library of Medicine Act in 1956 provided the occasion for internal review and survey of many of the Library's policies and practices. Among the first areas to be scrutinized was the interlibrary loan operation and the photoduplication service.

It was felt that the servicing of photocopies on a paid basis was, in large measure, being utilized as nothing more than a cheap and convenient reprint service. As a result of the study, the decision was taken to treat photoduplication and interlibrary loans as a single service.

The revision in policy here was conceived to offer something considerably more than a copying facility, something more consonant with the Library's purpose. Basically, the re-

vision in policy was directed toward servicing NLM's public impartially, making its collections available for most efficient reference service (i.e., by the utilization of photocopy to satisfy interlibrary loan requests, the original publications would be conserved for consultation at NLM), and strengthening medical libraries throughout the nation (i.e., the revised loan policy would bring local libraries directly into the picture).

Under the new plan, therefore, requests received directly from individuals for the loan of original materials or orders for photocopies would no longer be honored; rather, the requests would have to come in all cases from other libraries. In response to such requests, the NLM would furnish photocopy in lieu of the original materials whenever possible. It was perceived, also, that the change would cut down on the cost of service by minimizing expensive fiscal recordkeeping at NLM.

Such was the motivation. The loan policy revision, placed into operation in September 1957 and stemming from these concepts, displayed the following characteristics:

- (1) The interlibrary loan service would be extended to libraries exclusively; that is, the whole operation would be truly *interlibrary* in character.

- (2) The extension of interlibrary loan service would complement library resources of a given locality or area; accordingly, libraries would make a reasonable check of nearby libraries before submitting a loan request to NLM.

- (3) The NLM would make the determination as to the form of the loan, whether original material or photocopy should be transmitted, such determination to be made on the basis of various criteria, including length of the item requested, nature of the material, copyright restrictions, etc.

- (4) The interlibrary loan service would be granted without cost to the borrower, that is to say, the borrowing library could retain the photocopy permanently, and only the cost of returning original materials to NLM would be sustained by the borrowing library.

² This subject is more comprehensively treated in two articles: Rogers, Frank B. "Interlibrary loan, National Library of Medicine." *Library Journal* 83: 2114-2116, August 1958; Rogers, Frank B. "The loan policy of the National Library of Medicine." *Bulletin of the Medical Library Association* 45: 486-493, October 1957.

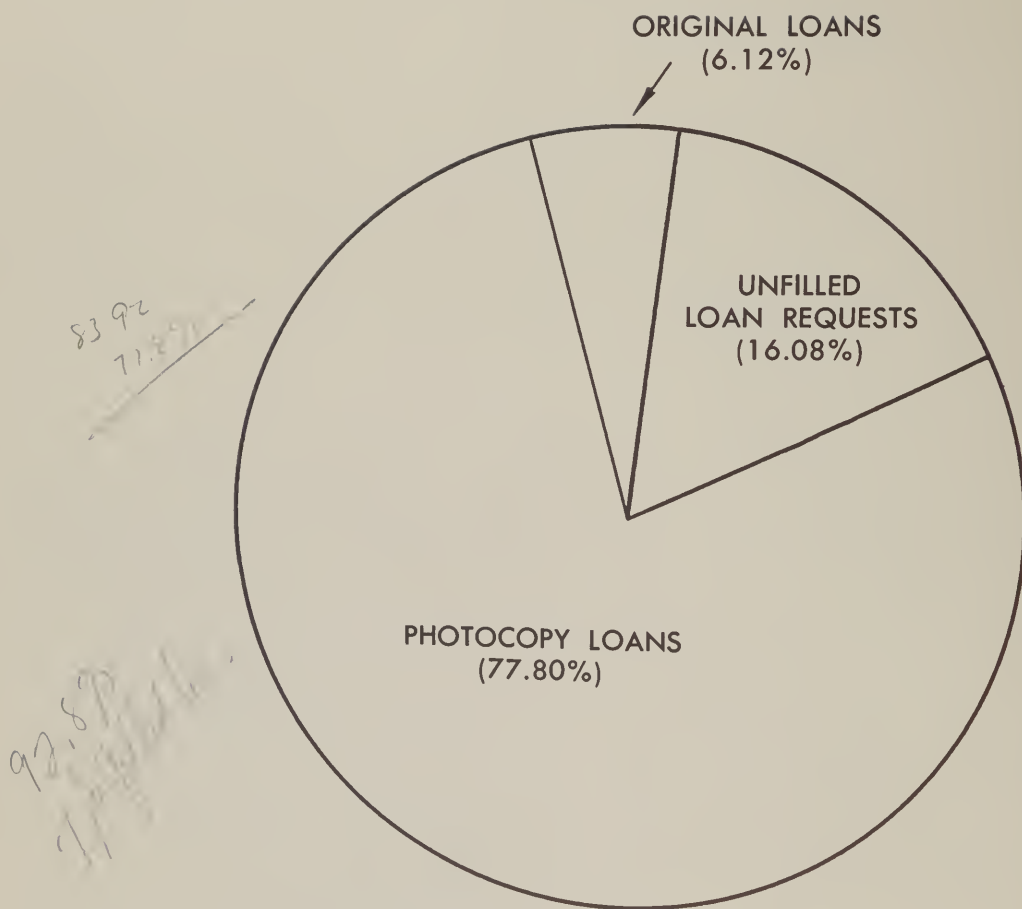


FIGURE 2. Interlibrary loan requests received and their disposition.

II

Some Implications of the Interlibrary Loan Operation

AREAS REQUIRING INFORMATION

Well before the phrase "some 325,000 interlibrary loans later" could be turned, both the scale and the rapidity of growth in the interlibrary loan operation inspired a number of questions, a more precise look at the program, its procedural operation, and, in summation, its effectiveness. Was it indeed accomplishing its avowed objective? A varied roster of speculations remained unanswered well into the course of the program's phenomenal growth.

The principal questions could be categorized according to several broad areas:

1. With respect to the serial titles:

(a) How many titles out of the Library's approximately 37,000 serial titles were actually subject to interlibrary loan demand?

(b) What was the identity of these titles?

(c) What was their frequency of request?

(d) Were the titles spoken for, in general, the more exotic serial titles, with relatively less demand for "garden variety" titles?

(e) Or, were the titles—and in what measure—those which we could reasonably expect libraries to have or conveniently secure locally?

(f) What time period of the serials requested was emphasized, and what was the change in pattern as serials aged?

(g) What patterns would be found to exist in terms of language and country of publication?

2. With respect to the libraries receiving the interlibrary loan service:

(a) How many libraries (both in the United States and abroad) received interlibrary loan service?

(b) Which libraries and the extent of their participation?

(c) The location of the libraries by State and city.

(d) What kinds or types of libraries comprised the clientele?

(e) What proportion existed between service to Federal and non-Federal libraries?

(f) What pattern would exist between libraries and the number of loans received? Was the service being abused?

3. With respect to the interrelationship between serial titles, on the one hand, and libraries, on the other hand:

(a) What correlation would exist between the more frequently used titles and the libraries receiving relatively high numbers of loans?

(b) Other correlations.

4. With respect to NLM operations or organization:

(a) What sort of relationship existed between titles indexed in *Index Medicus* and those not so indexed, in terms of requests for loan service? Would certain titles, not indexed, sustain a relatively larger number of requests, inviting consideration for inclusion in *Index Medicus*?

(b) Would justification be forthcoming for a physical rearrangement of the serial collection, based upon the pattern of loan activity?

(c) Should the loan request frequency be sufficiently high for a class of titles, would those titles be candidates for cover-to-cover microfilming, with extraction of material requested on loan to follow from the microfilm (rather than continue with the present operation of manually drawing the needed volume from the shelf and

filming the required article, *de novo*, each time?)

(d) Would the data give us a clue to the strengths and weaknesses of library resources (or of the nature of interlibrary loan operations) in various regions of the United States?

(e) What other factors could be illuminated, relating to the probability of demand in the future on the interlibrary loan operation, which would serve to improve the whole operation?

(An underlying, general motivation was the recognition of the need for a better systems approach to transacting such sizable numbers of interlibrary loans, and the possibility that a survey might uncover the prospect of new techniques for improving the day-to-day operation of the loan service.)

PREVIOUS INFORMATION ON THE INTERLIBRARY LOAN OPERATION

Some information was available. Two studies merit attention in this respect. One study antedated the revised loan policy and was informative from the standpoint of mirroring the nature and extent of the photoduplication operation carried on through the paid service; this study was completed in September 1955, and demonstrated a very heavy concentration of paid orders on a relatively small group of serial titles. A second study was carried out in 1958, shortly on the heels of the revision in loan policy, and encompassed a 3-month span of photocopy loans for serial titles. Thus, both the studies are significant from the standpoint of their timing, one occurring before and the other after the inauguration of the revised loan policy, providing two useful base points for comparison with the findings of the present survey.

The area of comparison between the old studies and the recent survey is, however, somewhat limited; the old studies addressed themselves to the dimension of serial titles loaned, did not essay to analyze the "consumer" or libraries, or the interrelationship between

loans and libraries; moreover, sufficiently accurate comparison is limited by differences in criteria and definitions employed, thereby limiting the desired fullness of comparison with the present survey.

Other information was provided by the monthly and annual operational statistics. These reported the raw totals of loan activity, with some categorization indicating loans to U.S. Federal Government libraries, and foreign versus domestic distribution, and the breakdown between original loans and loans satisfied by photocopy.

These combined to convey a general picture of probable activity and trends, but in essence were limited as analytical tools for the interpretation of the operation in any comprehensive sense. Moreover, we did not possess the desirable data showing us interrelationships between titles demanded on loan and the libraries constituting the clientele.

The information on hand, along with an intuitive feeling for the interlibrary loan operation as it burgeoned, was satisfactory for some guidance and administrative purposes, somewhat less desirable for certain others, and completely deficient in other important areas. In adequate depth and with sufficient precision many questions bearing on the interlibrary loan operation remained unanswered; as a consequence we were limited in evaluating the degree of effectiveness of the program and in knowing at precisely which points we might better manage this basic operation of the Library.

In addition, the sheer volume of the interlibrary loan requests themselves underscored, at times to an appalling degree, the need for a careful statistical inquiry into the program to learn the facts.

The considerations cited provided ample justification for the design of a new survey, comprehensive in scope, which would provide the necessary features for the extraction of the data and information needed. Since the overwhelming portion of the loan requests related to the serial titles and since the requests for serials almost exclusively called for photocopy, our inquiry was directed to this area.

III

Structure and Definition of the Survey

The consideration of the survey naturally turned to the area of the heaviest impact on the collections. This was the area of serial titles, which represented 93 percent of the loans transacted, with only 7 percent of the loans being for nonserial material. As mentioned, the area of serial loans was and is virtually the same area as that of the interlibrary loans satisfied by photocopy. This consideration shaped the outer limits to be defined in the survey.

In establishing the criteria or standards for the survey, it was realized that the standards ought to be of such a nature that periodic followup surveys could be pursued in terms of the same standards so that realistic comparisons would be possible in the rapidly growing interlibrary loan operation,

SOURCE DATA AND THE FACTORS TO BE ANALYZED

The logical choice for the raw data appeared to be the completed interlibrary loan forms. No record of use, for example, appeared in the individual volumes of serials. The completed interlibrary loan forms for calendar year 1959 had been purposely preserved for just such a prospective inquiry. These forms comprised all of the approximately 75,000 interlibrary loans which had been transacted in the form of photocopy between January and December 1959.

The use of the full year's coverage, to assure the comprehensive scope necessary for the survey, appeared warranted. Activity over a 12-month period could reasonably be expected to identify relatively little used serial titles, which in a survey cast in a more limited dimension of time would presumably go undetected. Similarly the representation of libraries making modest use of the interlibrary

loan service would be more likely to be incorporated in a full year's treatment of results, than if a smaller timespan were chosen.

The factors in the interlibrary loan operation deemed to warrant identification, description, and quantification—substantially the information required to answer the range of questions posed in chapter II—could be spelled out as follows:

1. The full title of the serial.
2. The country of publication.
3. Language of publication.
4. The year of publication of the serial title handled on interlibrary loan.
5. The name of the library.
6. The location of the library (State and city for libraries in the United States, country for libraries abroad).
7. Type of library; e.g., whether university, hospital, public, etc., with indication on whether the library was a U.S. Federal library or not.

It was considered desirable, too, to distinguish between serial titles indexed in *Index Medicus* and those not so indexed, in order to facilitate later analyses in such terms.

Other factors, concerning both the serial titles and the libraries, could be developed following the production of the preliminary data and analysis of its tendencies. The seven factors cited, however, covered the basic areas to be probed.

MECHANICS OF DATA PREPARATION

Considering the entire range of the inquiry, the number of factors to be summarized, and the nature of the analyses desired, it was decided that the survey could profitably be pursued through punchcard techniques.

This decision involved reduction or transcription of the factors (title, country of publication,

library, location, etc.) to a set of numeric codes. To transcribe the data existing on the approximately 78,000 interlibrary loan forms to punch-cards, it was desirable to compile two basic lists, one for serial titles, the other for libraries, and assign numeric codes to the individual titles and libraries in advance of the key punching operation.

It had been anticipated that the preponderant representation of serial titles would be titles indexed in *Index Medicus*. The basic list for these was already constituted; namely, the listing recorded in the January 1960 issue of *Index Medicus*. The approximately 1,600 titles in this list were simply assigned a 4-digit numeric code. In order to compile the titles not appearing in the *Index Medicus* list, the approximately 78,000 completed interlibrary loan forms were placed in 2 separate categories each by title; the first category consisted of the interlibrary loan forms relating to the *Index Medicus* titles; the second category consisted of the interlibrary loan forms pertaining to titles not in the *Index Medicus* list. The titles developed in the second category led to the preparation of a typed listing of such titles, which were also assigned a 4-digit numeric code.

We then possessed a basic list of titles with numeric codes assigned, the nature of the code differentiating between the *Index Medicus* titles and the non-*Index Medicus* titles.

The compilation of the basic list of libraries was achieved by photoduplicating the names and addresses of libraries, extracted from the January 1961 interlibrary loan forms, onto 3 by 5 card stock. These libraries were assigned a 4-digit numeric code.

The 78,000 interlibrary loan forms were then ready to be processed against the basic list of titles and the basic list of libraries. Each interlibrary loan form was examined and the code number for the title entered in the first column of a three-column Code Sheet: next, the code number for the requesting library was entered on the Code Sheet, through recourse to the basic list of libraries; and finally the year of publication of the serial title indicated on the loan form was entered on the Code Sheet. (The code for the year of publication was simply the last three digits of the actual year given, e.g., "1958" became "958.") Since the titles were in approximate order *by title*, this meant

that large numbers of interlibrary loan forms could be rapidly processed in blocks.

The complete three-column Code Sheets were then ready for the keypunching stage. From the Code Sheet a single Detail Analysis Card was prepared for each set of coded detail representing a completed interlibrary loan form. Such a Detail Analysis Card contained the numeric code for title, the numeric code for the library, and the numeric code representing the year of the publication loaned. This phase of the keypunching was restricted to these three factors.

The other factors, namely, country of publication, language of publication, location (State, city) of the library, and type of library were not relevant at this stage. To funnel these factors into the Detail Analysis Cards, the following procedure was followed. The basic list of titles (approximately 4,500) was given additional numeric coding to signify the country of publication and the language of publication. Similarly, the basic list of libraries (approximately 1,800) was given additional numeric coding to signify the location (State, city) and type of library.

The numeric coding on each serial title in the basic list of titles (title code, country of publication code, and language of publication code) was then punched into a Title Data Card; as stated, this totaled some 4,500 titles (or cards).

Similarly, the numeric coding on each library in the basic list of libraries (library code, State-city code, type-of-library code) was then punched into a Library Data Card; as stated, this totaled some 1,800 libraries (or cards).

Then, through sorting and collating techniques, the 78,000 Detail Analysis Cards were matched with the Title Data Cards on the basis of their common field, i.e., the title code number, following which the numeric codes on the Title Data Cards were "gang punched" into the Detail Analysis Cards.

The Detail Analysis Cards were then re-sorted and through collation matched with the Library Data Cards on the basis of their common field, i.e., the library code number, following which the numeric codes were "gang punched" into the Detail Analysis Cards.

Thus, each Detail Analysis Card then had numeric coding for : Title, country of publi-

cation, language of publication, year of the serial title supplied on loan, name of library, library location (State-city), type of library.

In order to set forth the distribution of loans according to the kind or type of library receiving the loans, a workable organization of kinds of libraries had to be contrived. It was reasoned that this breakdown ought not be too detailed, to avoid exhaustive classification problems, and not too broad, so that conclusions would be without meaning. The following compromise was fashioned:

Medical school libraries:

Libraries of medical schools, colleges of medicine schools of pharmacy, dentistry, nursing, osteopathy, veterinary medicine, public health, etc.

Medical society libraries:

Medical and allied science association, society, and academy libraries whether organized on a national, State, or municipal basis or by subject fields such as cancer, heart, etc.

Federal Government medical libraries:

Medical libraries of any branch of the Federal Government, excluding the following five types of libraries.

Army medical libraries:

Hospital libraries for professional staff use, medical research libraries, graduate school medical libraries, institute medical libraries.

Navy medical libraries:

Hospital libraries for professional staff use, medical research libraries, graduate school medical libraries, institute medical libraries.

Air Force medical libraries:

Hospital libraries for professional staff use, medical research libraries, graduate school medical libraries, institute medical libraries.

Veterans' Administration medical libraries:

Hospital libraries, medical research libraries, graduate school medical libraries, institute medical libraries.

Public Health Service libraries:

Reference room libraries, offices of regional directors, as well as hospital libraries, medical research libraries, graduate school medical libraries, institute medical libraries.

Hospital libraries:

Libraries for both professional staff use and patients' use in hospitals not supported by the Federal Government; includes university hospital libraries as well as State-supported, municipal and privately or commercially supported hospitals; includes libraries in hospitals attached to and supported by commercial research organizations or foundations; includes libraries in clinics, (whether inpatient or outpatient), homes for aged, retarded children, specialty hospitals, i.e., orthopedic, ophthalmic, mental, etc.

Industrial, research, and foundation libraries, medical and nonmedical:

Libraries in both profit and nonprofit organizations in any field; includes non-Government "research and scientific development" libraries.

Other medical libraries:

Libraries of State boards of health, city boards, etc., but not restricted to State or municipal medical libraries; includes any medical library which cannot be classed in the preceding categories.

International organizations, medical or nonmedical.

Federal Government libraries, nonmedical:

Nonmedical libraries of the U.S. Government.

Public libraries; State and municipal libraries:

Nonmedical State, city, and county free libraries for use by the general public; includes non-medical libraries organized primarily for use of State or local governments, or as archival collections.

College and university libraries:

General, nonmedical libraries of colleges and universities; includes departmental libraries as well as libraries serving nonmedical graduate schools.

Elementary and secondary school libraries.

TABULATION OF THE DATA

The 78,000 Detail Analysis Cards were then processed by means of tabulation techniques to yield a number of lists: by serial title, with subarrangement by year of the serial loaned, and by library served. The tabulations themselves can more purposefully be recited by examination of the findings which are shown in the following pages.

IV

Findings and Analysis: The Libraries Receiving Interlibrary Loan Service

THE GENERAL PATTERN

In the period covered by the survey, calendar year 1959, a total of 1,780 libraries in the United States and abroad received interlibrary loan service in the form of photocopy. The

number of libraries yields ample evidence of the loan program's effective reach and its large-scale support to library resources.

This initial observation is, however, immediately tempered (but by no means eradicated)

TABLE 2.—*Libraries classed according to numbers of loans*

Number of li-braries	Number of loans	Percent of libraries	Cumulated percent of libraries (ascending)	Cumulated percent of libraries (descending)
287	1	16. 12	16. 12	100. 00
138	2	7. 75	23. 87	83. 86
119	3	6. 68	30. 55	76. 11
98	4	5. 50	36. 05	69. 43
78	5	4. 38	40. 43	63. 93
254	6-10	14. 26	54. 71	59. 55
974	-----	54. 71	-----	-----
239	11-20	13. 42	68. 13	45. 29
110	21-30	6. 17	74. 30	31. 87
75	31-40	4. 21	78. 51	25. 70
62	41-50	3. 48	81. 99	21. 49
33	51-60	1. 85	83. 84	18. 01
33	61-70	1. 85	85. 69	16. 16
25	71-80	1. 40	87. 09	14. 31
28	81-90	1. 57	88. 66	12. 91
27	91-100	1. 57	90. 21	11. 34
632	-----	35. 50	-----	-----
92	101-200	5. 16	95. 37	9. 77
36	201-300	2. 02	97. 39	4. 58
15	301-400	. 84	98. 23	2. 56
9	401-500	. 50	98. 73	1. 72
15	501-1, 000	. 84	99. 57	1. 22
6	1, 001-2, 000	. 33	99. 90	. 38
1	2, 001-2, 250	. 05	100. 00	-----
174	-----	9. 77	-----	-----
1, 780	-----	100. 00	-----	-----

when we examine our data more closely. First, by far the larger portion of the 1,780 libraries received from negligible to modest support through the interlibrary loan operation; indeed, some 80 percent of the 1,780 libraries account for only 20 percent of the loans; it follows that the remaining 20 percent of the libraries account for 80 percent of the interlibrary loans.

We find that a total of 287 libraries accounted for only 1 loan apiece during the entire period of 1 year covered by the survey, and that another group of 138 libraries accounted for 2 loans apiece. Yet, at the other end of our distribution, we find a total of 7 libraries accounting for over 1,000 loans apiece. The full distribution is portrayed in table 2.

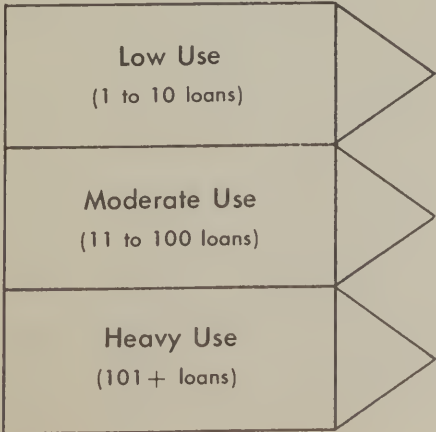
If we reorganize the libraries arbitrarily into 3 separate categories according to the number of loans received, such that from 1 to 10 loans would constitute "Low Use," 11 to 100 loans "Moderate Use," and 101 and more loans, "Heavy Use," we find the relationship shown in the diagram below.

In conjunction with these data we may now consider the *total number of loans* accounted for by each of our three arbitrarily chosen categories of "Low Use," "Moderate Use," and "Heavy Use."

We now enter these figures, including the percentage of the total loans (77,698) accounted for by each category of library use (table 3).

ARRANGEMENT OF LIBRARIES IN CLASSES ACCORDING TO LOANS ACCOUNTED FOR

Library use of the interlibrary loan service can be pictured in an alternative form. If the



libraries are arrayed in terms of the number of loans received, in descending order, and then arranged in classes of 100 libraries each, we can see the relative decline in loans. (There are thus 17 complete classes of 100 libraries each, from the total library representation of 1,780 libraries in our survey.) This arrangement is set forth in table 4 on the following page. We see here that the first class of 100 libraries (i.e., the 100 libraries receiving the highest total of loans) accounts for 41,726 loans, or 53.70 percent of the total loans. We note that the first 2 classes of libraries combined account for 53,937 loans, or 69.41 percent of all the loans. We note here too that the cumulated percent of all loans grows very slowly after the second class of libraries has been considered, reflecting again the great concentration of loans accounted for by the first 2 classes of 100 libraries.

CHARACTERISTICS OF LARGE-SCALE LIBRARY USERS

In figure 4, pages 14-15, the 50 libraries accounting for the largest number of loans are described by "type" of library, and their

TABLE 3.—Libraries and number of loans accounted for

Category	Number of libraries	Percent of libraries	Number of loans	Percent of loans
Low use.....	974	54. 71	3, 668	4. 72
Moderate use---	632	35. 50	22, 609	29. 09
Heavy use-----	174	9. 77	51, 421	66. 18

This data is converted to bar graph form, in figure 3

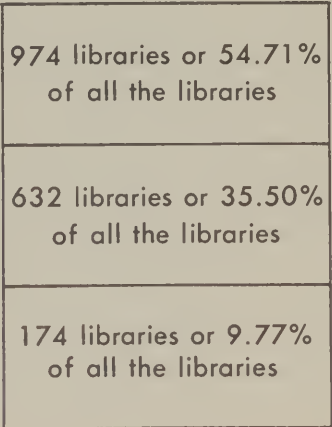


TABLE 4.—*Relationship of libraries and loans*

Class	Number of loans	Cumulated number of loans	Percent of all loans	Cumulated percent of all loans	Cumulated percent of libraries ¹
1-----	41, 726	41, 726	53. 70	53. 70	5. 61
2-----	12, 211	53, 937	15. 71	69. 41	11. 23
3-----	7, 254	61, 191	9. 33	78. 75	16. 65
4-----	4, 581	65, 772	5. 89	84. 65	22. 47
5-----	3, 200	68, 972	4. 11	88. 76	28. 08
6-----	2, 206	71, 178	2. 83	91. 60	33. 70
7-----	1, 603	72, 781	2. 06	93. 67	39. 32
8-----	1, 229	74, 010	1. 58	95. 25	44. 94
9-----	936	74, 946	1. 20	96. 45	50. 56
10-----	716	75, 662	. 92	97. 37	56. 17
11-----	556	76, 218	. 71	98. 09	61. 79
12-----	434	76, 652	. 55	98. 65	67. 41
13-----	332	76, 984	. 42	99. 08	73. 03
14-----	253	77, 233	. 32	99. 40	78. 65
15-----	189	77, 422	. 24	99. 64	84. 26
16-----	100	77, 522	. 12	99. 77	89. 88
17-----	100	77, 622	. 12	99. 90	95. 50
18-----	80	77, 698	. 09	100. 00	100. 00
Total-----	77, 698	-----	-----	-----	-----

¹ Each class of libraries, of 100 libraries each, constitutes 5.6179 percent of the 1,780 libraries. The above table records only the cumulated percentages since the classes of libraries are equal.

location. This anticipates, in part, the summary of results relating to the loans arranged by the types of libraries accounting for the loans; however, the figure represents a rounding out of the data describing the distribution of loans and for this purpose is presented at this juncture.

A total of 38 libraries are located in the United States, with 20 of these situated in the metropolitan area of the District of Columbia. In addition, a total of five libraries are U.S. Federal agency libraries overseas. Completing the group of 50 libraries are 7 foreign libraries.

From the standpoint of type of library concerned, a total of 8 are Army medical libraries, 3 are Navy libraries, 6 are Air Force libraries, 1 Veterans' Administration, 3 are Public Health Service libraries, and there are 6 U.S. Government nonmedical libraries, summing up to 27 libraries with the U.S. Government group; medical school libraries number 7, and 9 are hospital libraries, with the remaining categories of libraries totaling 7 libraries completing the group of 50 according to type of library arrangement.

LARGE-SCALE USE

We next take up the question of the concentration of loans within the limits of a relatively small percentage of the total library population comprising the survey. It is desirable to find some elaboration of the meaning of this imbalance.

The distribution of loans among libraries has to take into account a number of pertinent factors: the location of the libraries; their purpose and program; the nature and extent of their collections; the location of other libraries (and the degree to which their collections may be drawn upon); the kinds of serial titles supplied on loan (whether these are relatively "exotic" or "garden variety" titles; and the time period of the serial titles made available on loan.

One library, on the basis of these considerations, may have received only 10 loans during the year surveyed; however, the 10 loans may have contributed the same level of support needed by that library for its particular needs, just as much as the extension of 300 loans to another library, where the combination of

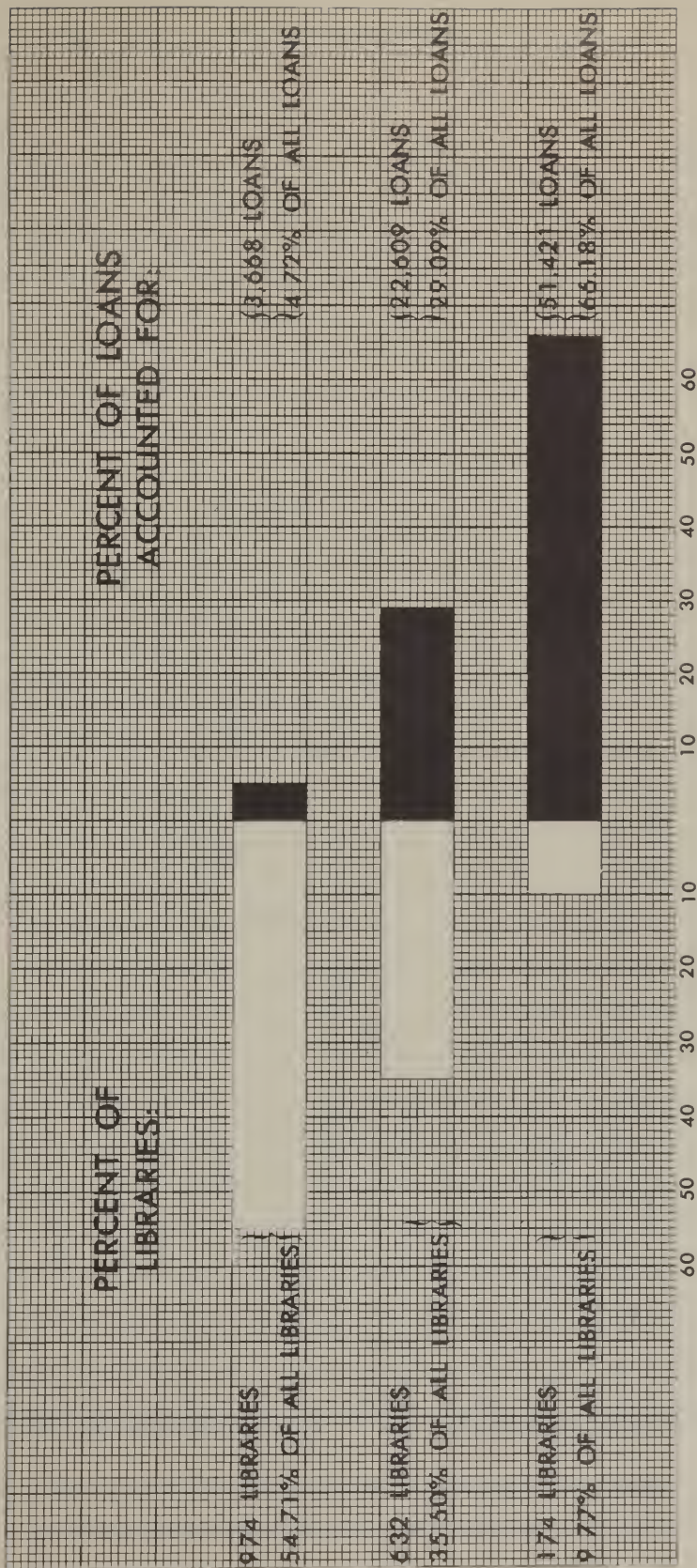


FIGURE 3. Libraries and loans.

	U.S. GOVERNMENT MEDICAL													
	ARMY MEDICAL	NAVY MEDICAL	AIR FORCE MEDICAL	VETERANS MEDICAL	PUBLIC HEALTH ADMINISTRATION	U.S. GOVERNMENT SERVICE	U.S. GOVERNMENT NONMEDICAL	MEDICAL SCHOOL	MEDICAL SOCIETY	HOSPITAL	INDUSTRIAL, RESEARCH	PUBLIC (STATE, MUNICIPAL)	COLLEGE AND UNIVERSITY	OTHER NONMEDICAL
1					⊙									2,105
2										○				1,910
3	⊙													1,798
4	⊙													1,416
5									○					1,328
6						⊙								1,298
7													●	1,134
8					⊙									862
9						●								825
10								⊙						793
11			○											739
12			○											656
13								⊙						652
14		○												601
15		●												590
16	⊙													584
17						●								566
18					○									564
19	●													548
20								⊙						547
21			⊙											525
22	⊙													521
23			⊙											494
24	⊙													492
25							○							468

○ = Library located in U.S.

● = Library located overseas

⊙ = Library located in District of Columbia area

FIGURE 4. The fifty largest library-users and their characteristics.

	U.S. GOVERNMENT MEDICAL													
	ARMY MEDICAL	NAVY MEDICAL	AIR FORCE MEDICAL	VETERANS MEDICAL	PUBLIC HEALTH ADMINISTRATION	PUBLIC HEALTH SERVICE	U.S. GOVERNMENT NONMEDICAL	MEDICAL SCHOOL	MEDICAL SOCIETY	HOSPITAL	INDUSTRIAL, RESEARCH	PUBLIC (STATE, MUNICIPAL)	COLLEGE AND MUNICIPAL	OTHER NONMEDICAL
26							⊗							464
27	●													455
28									●					447
29	⊗													443
30						⊗								412
31				⊗										401
32					⊗									386
33									○					379
34		●												378
35							○							377
36									●					375
37				○										360
38												○		351
39					⊗									337
40								○						336
41							●							329
42	⊗													326
43		○												316
44							○							315
45									●					308
46								○						304
47		●												297
48									○					288
49								○						284
50								○						281

○ = Library located in U.S.

● = Library located overseas

⊗ = Library located in District of Columbia area

FIGURE 4. The fifty largest library-users and their characteristics. Continued.

factors mentioned may have properly dictated a larger support in numerical terms.

One other factor is to be mentioned. The NLM plays a special role in the area of the District of Columbia and to Federal establishments overseas. We might distinguish here between use of the NLM as a regional library, and the use of NLM as a library of "second resort" or to support what could be called residual demand. The demand on NLM in the first instance is substantial, both within the metropolitan area of the District of Columbia, and with respect to the loan response to Federal establishments located overseas. The further analysis of the library data brings out the substance of this type of loan support. This accounts in large measure for the imbalance observed in our frequency distributions.

WORLDWIDE DISTRIBUTION OF THE LOANS

Here we examine the geographic distribution of the loans, tabulating the data according to the continent and country of origin of the libraries.¹ The following pattern is displayed.

TABLE 5.—*Distribution of loans by world geographic area*

Area	Loans	Percent of loans
Africa.....	142	0. 18
North America.....	¹ 69, 080	88. 90
South America.....	4, 796	6. 17
Asia.....	583	. 75
Europe.....	2, 826	3. 64
Oceania.....	271	. 34
Total.....	77, 698	100. 00

¹ Includes 4,861 loans distributed to U.S. Federal agencies overseas, as part of the U.S. total.

The overwhelming portion of the loans are distributed in North America; for both North and South America, the total is 95.08 percent, with loans to other world areas less than 5 percent.

The 10 countries constituting the largest recipients of the loans are set forth in the following.

¹ The geographic classification is that used in the *Statistical Yearbook of the United Nations*, 1960.

TABLE 6.—*The 10 countries receiving highest total of loans*

Country	Loans
United States.....	¹ 66, 022
Brazil.....	2, 137
Mexico.....	1, 369
Canada.....	1, 052
Peru.....	754
Italy.....	613
Venezuela.....	508
Colombia.....	469
Argentina.....	461
Israel.....	283

¹ The U.S. figure includes 4,861 loans sent abroad to various U.S. Government agencies; they are regarded here for purposes of this construction as simply an extension of U.S. libraries.

DISTRIBUTION OF LOANS IN THE UNITED STATES

The distribution of loans in the United States is set forth in table 7 according to the regional breakdown employed by the Bureau of the Census. The total number of loans in the United States is 61,161. The number of loans distributed is given in terms of the census region, by State, and also expressed as a percentage of the total United States distribution.

The distribution of loans in the United States is set forth in a bar graph (fig. 5), utilizing the census region breakdown. The great prominence of the South Atlantic region in terms of loans is shown here.

This prominence is largely due to the impact of the many medical and research facilities, both governmental and nongovernmental, in the general area of the District of Columbia. This representation, in fact, is shown most clearly if we use as a basis the standard "Metropolitan Area of the District of Columbia",² which includes several nearby Virginia and Maryland suburbs, and regroup the loans accordingly.

Our distribution of loans by State and census region can be re-presented with the addition of other data for comparative purposes (table 8). We can enter the number of loans received by each State in terms of a percentage of the overall

² As defined in: U.S. Bureau of the Budget. Office of Statistical Standards. *Standard Metropolitan Statistical Areas*. Washington, 1961.

TABLE 7.—*Distribution of loans in the United States*

Division and State	Total number of libraries	Total number of loans	Loans, percent of U.S. total
Continental United States.....	1, 417	61, 161	100. 00
New England.....	102	3, 019	4. 93
Maine.....	10	203	. 33
New Hampshire.....	2	55	. 08
Vermont.....	3	87	. 14
Massachusetts.....	47	1, 458	2. 38
Rhode Island.....	9	139	. 22
Connecticut.....	31	1, 077	1. 76
Middle Atlantic.....	299	9, 089	14. 86
New York.....	165	5, 512	9. 01
New Jersey.....	63	1, 554	2. 54
Pennsylvania.....	71	2, 023	3. 30
East North Central.....	200	6, 345	10. 37
Ohio.....	77	2, 454	4. 01
Indiana.....	19	408	. 66
Illinois.....	45	1, 768	2. 89
Michigan.....	44	1, 537	2. 51
Wisconsin.....	15	178	. 29
West North Central.....	90	2, 466	4. 03
Minnesota.....	20	436	. 71
Iowa.....	14	562	. 91
Missouri.....	26	825	1. 34
North Dakota.....	7	119	. 19
South Dakota.....	2	4	-----
Nebraska.....	6	111	. 18
Kansas.....	15	409	. 66
South Atlantic.....	396	31, 180	50. 97
Delaware.....	7	67	. 10
Maryland.....	44	5, 453	8. 91
Virginia.....	30	1, 123	1. 83
West Virginia.....	18	962	1. 57
North Carolina.....	25	1, 083	1. 77
South Carolina.....	18	927	1. 51
Georgia.....	27	1, 449	2. 36
Florida.....	45	1, 611	2. 63
Metropolitan area of District of Columbia.....	182	18, 505	30. 25
East South Central.....	63	2, 126	3. 47
Kentucky.....	21	977	1. 59
Tennessee.....	24	667	1. 09
Alabama.....	13	383	. 62
Mississippi.....	5	99	. 16

TABLE 7.—*Distribution of loans in the United States—Continued*

Division and State	Total number of libraries	Total number of loans	Loans, percent of U.S. total
West South Central.....	86	3, 138	5. 13
Arkansas.....	7	492	. 80
Louisiana.....	16	797	1. 30
Oklahoma.....	13	178	. 29
Texas.....	50	1, 671	2. 73
Mountain.....	61	1, 606	2. 62
Montana.....	11	58	. 09
Idaho.....	3	17	. 02
Wyoming.....	1	4	-----
Colorado.....	15	578	. 94
New Mexico.....	9	632	1. 03
Arizona.....	13	91	. 14
Utah.....	5	182	. 29
Nevada.....	4	44	. 07
Pacific.....	113	1, 862	3. 02
Washington.....	15	129	. 21
Oregon.....	7	242	. 39
California.....	86	1, 303	2. 13
Alaska.....	3	159	. 25
Hawaii.....	2	29	. 04
Outlying parts of the United States.....	7	330	. 55
American Samoa.....	1	173	. 28
Canal Zone.....	2	43	. 07
Guam.....	1	15	. 02
Puerto Rico.....	3	99	. 06
Virgin Islands.....	0	0	0

distribution of loans in the United States (61,161), and add thereto the percent of population, the percent of Public Health Service grants and awards by NIH (fiscal year 1960), and the percentage of physicians. The most marked disparity occurs in the Pacific States where the percent of physicians is 12.26, PHS grants is 15.27 percent; population, 11.82 percent; with loans only 2.73 percent.

THE TYPES OF LIBRARIES AND LOANS

Table 9 organizes the loans into the type of library organizational pattern previously mentioned. The table relates to the 61,161 loans

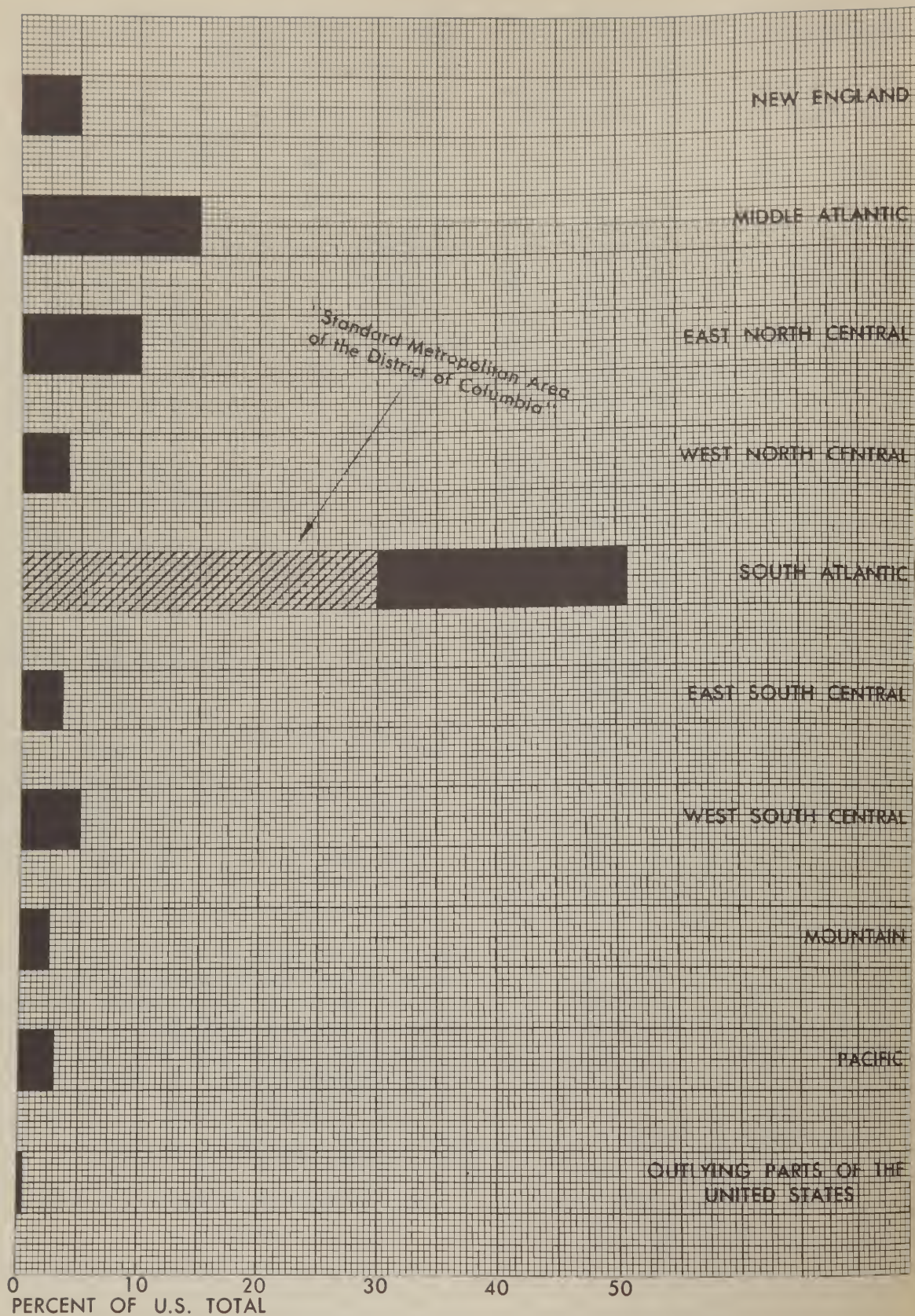


FIGURE 5. Distribution of loans in the U.S. according to census region.

TABLE 8.—*Distribution of loans in United States, showing population, NIH grants, and physicians in percentages*

Division	Total number of libraries	Total number of loans	Loans, percent of U.S. total	Percent of population	Public Health Service grants and awards by NIH (fiscal year 1960), percent of total U.S. grants	Percent of physicians
Continental United States-----	1, 417	61, 161	100. 00	100. 00	100. 00	100. 00
New England-----	102	3, 019	4. 93	5. 86	14. 76	7. 01
Middle Atlantic-----	299	9, 089	14. 86	19. 05	25. 51	22. 99
East North Central-----	200	6, 345	10. 37	20. 20	15. 47	17. 44
West North Central-----	90	2, 466	4. 03	8. 58	7. 30	7. 21
South Atlantic-----	396	31, 180	50. 97	14. 48	9. 34	11. 45
Metropolitan area of District of Columbia-----	182	18, 505	30. 25	. 42	2. 12	1. 06
East South Central-----	63	2, 126	3. 47	6. 71	2. 82	4. 35
West South Central-----	86	3, 138	5. 13	9. 45	4. 77	6. 97
Mountain-----	61	1, 606	2. 62	3. 82	2. 54	2. 98
Pacific-----	113	1, 862	3. 02	11. 82	15. 27	12. 26
Outlying parts of the United States-----	7	330	. 55	-----	-----	-----

TABLE 9.—*Distribution of loans in the United States arranged by type of library*

Category of library	Loans	Percent of U.S. loans
Medical school libraries-----	8, 284	13. 54
Medical society libraries-----	2, 119	3. 46
Federal Government medical libraries-----	293	¹ 33. 33
Army medical libraries-----	9, 179	(15. 00)
Navy medical libraries-----	1, 649	(2. 69)
Air Force medical libraries-----	2, 556	(4. 17)
Veterans' Administration libraries-----	2, 844	(4. 65)
Public Health Service libraries-----	3, 865	(6. 31)
Hospital libraries-----	12, 612	20. 62
Industrial, research and foundation libraries (medical and nonmedical)-----	7, 708	12. 60
Other medical libraries-----	636	1. 03
International organizations (medical and nonmedical)-----	100	. 16
Federal Government nonmedical libraries-----	5, 046	8. 25
Public libraries, State and municipal libraries-----	1, 465	2. 39
College and university libraries-----	2, 521	4. 12
Elementary and secondary school libraries-----	68	. 11
Other nonmedical libraries-----	216	. 35
Total-----	61, 161	100. 00

distributed in the United States, and reflects, at the bottom of the table, the additional 4,861 loans distributed to U.S. Federal agency libraries overseas. The main distribution in the United States is to Federal Government medical libraries; i.e., 33.33 percent of the total U.S. distribution of 61,161. (If we regard the total of 61,161 and 4,861 as our universe, then the total percentage of U.S. Federal Government medical libraries becomes 39.58 percent.) Continuing from the standpoint of distribution of loans within the geographic United States, the hospital libraries account for the next highest category of loans with 20.62 percent. Medical school libraries are next with 13.54 percent of the total U.S. loan distribution.

¹ The 33.33 percent relates to the aggregate of loans (20,386) distributed to Federal Government medical libraries as a whole, including the 293 loans not included in the specific subclasses of Army, Navy, etc.

Federal Government medical libraries received, in addition to the totals specified in the table, the following numbers of loans distributed to installations overseas:

Army medical libraries-----	2, 473
Navy medical libraries-----	1, 265
Air Force medical libraries-----	1, 123

for a total of 4,861. The grand total of distribution in the United States and to U.S. installations abroad then becomes 66,022.

Table 10, which follows, sets forth the number of loans received by foreign libraries arranged in terms of the type of library involved. The heaviest type of library recipient is com-

prised of the medical school libraries, accounting for some 35 percent of the distribution abroad. Hospital libraries account for 12.67 percent of the foreign library distribution.

TABLE 10.—*Distribution of loans to foreign countries arranged by type of library*

Type of library	Loans	Percent of foreign loans
Medical school libraries.....	4, 083	34. 96
Medical society libraries.....	665	5. 69
Foreign government medical libraries.....	122	1. 04
Hospital libraries.....	1, 480	12. 67
Industrial, research and foundation libraries (medical and non-medical).....	1, 797	15. 39
Other medical libraries.....	984	8. 42
International organizations (medical and nonmedical).....	127	1. 08
Foreign government nonmedical libraries.....	288	2. 46
Public libraries, State and municipal libraries.....	38	-----
College and university libraries.....	789	6. 75
Other nonmedical libraries.....	1, 303	11. 15
Total.....	11, 676	100. 00

V

Findings and Analysis: Serial Titles

A total of 4,347 serial titles were subject to loan during the period covered by the survey (calendar year 1959). The total number of serial titles in the NLM is approximately 37,000.¹

This means that some 88 percent of the Library's serial titles was not subject to a single loan during a period of 1 year. We can press this point a bit further: even comprehending the class of serial titles used on loan (4,347), a total of 1,235 serial titles—or 28.41

percent of the serial titles used on loan—were subject to loan only once. A total of 532 titles were used only twice, and 307 titles were used only 3 times during the course of a year. But at the other end of the spectrum there was extensive activity related to a relatively small number of titles, ranging up to 721 loans for the most heavily used serial—*Lancet*—with the 100 most used serial titles averaging 227.6 loans apiece. The full tabulation, indicating number of uses per title, is displayed in table 11.

If we reorganize our titles—as we previously did with the libraries—into 3 separate, arbitrarily chosen categories according to the number of loans generated, such that from 1 to 10 loans would constitute “Low Use”; 11 to 100 loans, “Moderate Use”; and 101 and over loans, “Heavy Use,” we find the relationship shown in the diagram on page 22.

In conjunction with these data we may now consider the *total loans* accounted for by each of our three separate arbitrarily chosen categories of “Low Use,” “Moderate Use,” and “Heavy Use.”

We now enter the total loans (77,698) according to the level accounted for by each of the three categories, adding as well the percentage of total loans accounted for.

TABLE 11.—Serial titles and number of loans

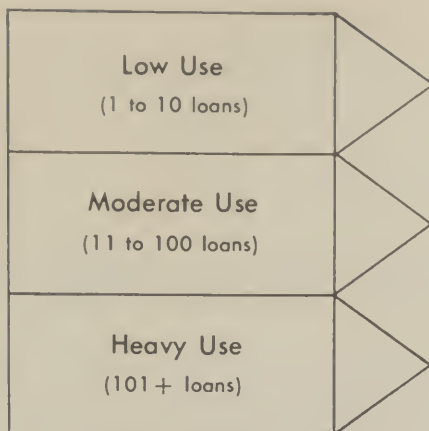
Titles	Number of loans	Percent of titles	Cumulated percent of titles
1, 235.....	1.....	28. 41	28. 41
532.....	2.....	12. 23	40. 64
307.....	3.....	7. 06	47. 70
237.....	4.....	5. 45	53. 15
176.....	5.....	4. 04	57. 19
514.....	6 to 10.....	11. 82	69. 03
472.....	11 to 20.....	10. 85	79. 88
231.....	21 to 30.....	5. 31	85. 19
143.....	31 to 40.....	3. 28	88. 47
104.....	41 to 50.....	2. 39	90. 87
63.....	51 to 60.....	1. 44	92. 31
65.....	61 to 70.....	1. 49	93. 80
50.....	71 to 80.....	1. 15	94. 25
26.....	81 to 90.....	. 59	94. 84
31.....	91 to 100.....	. 71	95. 55
119.....	101 to 200.....	2. 73	98. 28
28.....	201 to 300.....	. 64	98. 92
6.....	301 to 400.....	. 13	99. 56
4.....	401 to 500.....	. 09	99. 65
4.....	501 to 800.....	. 09	100. 00
Total..... 4, 347	100. 00

¹ “In March 1958 the Acquisition Division reported that an inventory of the Serials Holdings File showed a total of 36,735 serial titles, of which 18,314 were not yet cataloged.” NLM *Annual Report* for 1960, p. 18.

TABLE 12.—Serial titles and number of loans accounted for

Category	Number of titles	Percent of titles	Number of loans	Percent of loans
Low use.....	3, 001	69. 03	8, 983	11. 56
Moderate use.....	1, 185	27. 26	38, 512	49. 56
Heavy use.....	161	3. 70	30, 203	38. 87

We encounter here a resemblance to the picture previously indicated for the relationship between libraries and loans. These relationships are set forth in a visual format, displaying the



3,001 titles or 69.03% of all the titles
1,185 titles or 27.26% of all the titles
161 titles or 3.70% of all the titles

percentages of titles on one side of the graph and the percentages of loans accounted for on the other side of the graph (fig. 6).

TABLE 13.—Loan demand for *Index Medicus* titles compared to other titles used

Number loans	<i>Index Medicus</i> titles	Non- <i>Index Medicus</i> titles	Total titles
1.....	70	1, 165	1, 235
2.....	52	480	532
3.....	37	270	307
4.....	36	201	237
5.....	43	133	176
6-10.....	175	339	514
Subtotal 1-10.....	413	2, 588	3, 001
11-20.....	292	180	472
21-30.....	172	59	231
31-40.....	120	23	143
41-50.....	96	8	104
51-60.....	56	7	63
61-70.....	56	9	65
71-80.....	47	3	50
81-90.....	24	2	26
91-100.....	30	1	31
Subtotal 11-100...	893	292	1, 185
101-200.....	117	2	119
201-300.....	28	0	28
301-400.....	6	0	6
401-500.....	4	0	4
501-800.....	4	0	4
Subtotal 101-800..	159	2	161
Grand total.....	1, 465	2, 882	4, 347

Figure 6 presents the picture in percentages of serial titles considering all of the titles used (4,347) as equivalent to 100 percent. If we consider not the total number of titles used, but the total number of titles (37,000) in the NLM as constituting our 100 percent, we obtain the interesting results shown in figure 7, which is presented in the same form as figure 6. In figure 7 we find that 88.25 percent of the serial titles did not experience a single loan.

LOAN DEMAND FOR SERIAL TITLES LISTED IN THE "INDEX MEDICUS"

This section is devoted to the furnishing of relevant data regarding loan demand for the serial titles indexed in the *Index Medicus*.²

A total of 1,465 titles listed in the *Index Medicus*, out of the 1,569 serial titles indexed, were subject to loan at least once during the year, leaving 104 titles without any loan demand at all. There were a total of 70 *Index Medicus* titles used once, 52 used twice, and *Index Medicus* titles used from 1 to 10 times numbered 413 titles. *Index Medicus* titles used 101 and more times (with a high of 721 loans for *Lancet*) totalled 159. To portray the relationship between *Index Medicus* titles and other titles in the NLM collection which were used in the interlibrary loan operation (these titles are termed "non-*Index Medicus*") we can reformulate a previous table, with some striking results (Table 13).

² The serial titles indexed in the *Index Medicus*, as listed in the January 1960 issue of the *Index Medicus*.

TITLES

LOANS

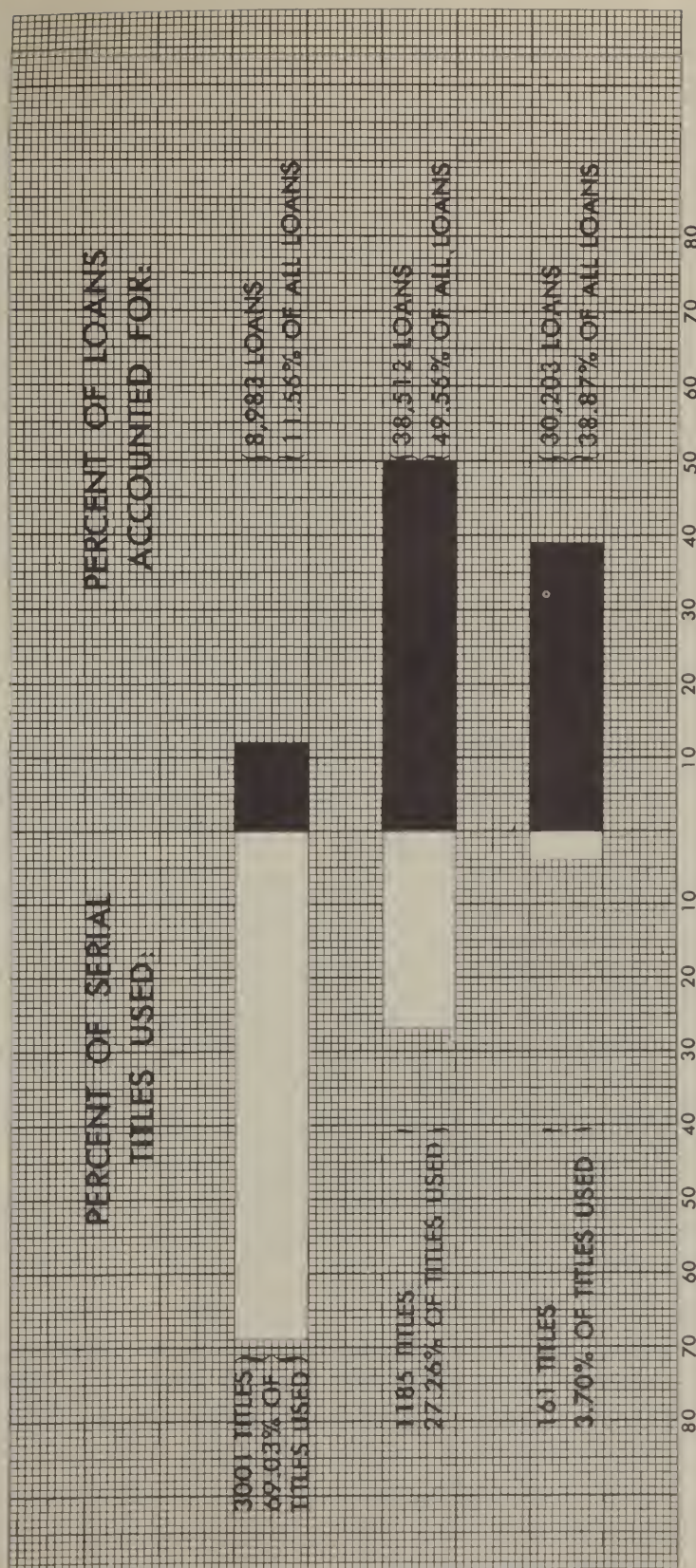


FIGURE 6. Serial titles and loans.

This interesting relationship can be set forth in another manner. If we take the 2,882 non-*Index Medicus* titles and arrange them in terms of our three arbitrary categories of "Low Use," "Moderate Use," and "Heavy Use," we obtain the following from the previous table.

TABLE 14.—Non-Index Medicus titles classed by degree of use

Use category	Titles	Percent of non-Index Medicus titles used
Low-----	2, 588	89. 82
Moderate-----	292	10. 13
Heavy-----	2	. 05
All use-----	2, 882	100. 00

Similarly, the *Index Medicus* titles exhibit the following pattern:

TABLE 15.—Index Medicus titles classed by degree of use

Use category	Titles	Percent of Index Medicus titles used
Low-----	413	28. 17
Moderate-----	893	60. 99
Heavy-----	159	10. 84
All use-----	1, 465	100. 00

The absolute number, as well as percentage, is tremendously higher for non-*Index Medicus* titles in the "Low Use" category; in the "Moderate" and "Heavy Use" categories, both in terms of the percentages and in terms of absolute numbers, the *Index Medicus* titles are far higher than the non-*Index Medicus* titles.

We can now examine the loans produced by the various titles, preserving our distinction here between *Index Medicus* and non-*Index Medicus* titles. This is brought out in table 16.

The 1,465 *Index Medicus* titles account for 63,829 loans out of the total loan figure of 77,698, or 82.15 percent of all the loans. The 2,882 non-*Index Medicus* titles account for

TABLE 16.—Index Medicus titles and non-Index Medicus titles and respective loans compared

Loan or use category	Number IM titles	Number loans	Number non-IM titles	Number loans	Total titles	Total loans
1-10 loans----	413	2, 004	2, 588	6, 979	3, 001	8, 983
11-100 loans--	893	31, 867	292	6, 645	1, 185	38, 512
101-800 loans..	159	29, 958	2	245	161	30, 203
Total--	1, 465	63, 829	2, 882	13, 869	4, 347	77, 698

13,869 loans out of the total loan figure of 77,698, or 17.85 percent of all the loans.

The average number of loans per title, figuring all loans, all titles, works out to be 17.87; however, the average number of loans for the *Index Medicus* titles is 43.56, that on non-*Index Medicus* titles is 4.81.

Our data may be rearranged, considering the total universe of all loans (77,698) and all titles (4,347), and computing the percentages of titles which satisfy a given percentage of loans, using the categories of Low, Moderate, and Heavy Use, and distinguishing between *Index Medicus* and non-*Index Medicus* titles.

TABLE 17.—Index Medicus titles and non-Index Medicus titles and respective loans compared in percentage terms

Loan or use category	Percent of IM titles of all titles (4,347)	Percent of all loans accounted for	Percent of non-IM titles of all titles (4,347)	Percent loans accounted for
Low: 1-10 loans--	9. 50	2. 57	59. 53	8. 98
Moderate: 11-100 loans----	20. 54	41. 01	6. 71	8. 55
Heavy: 101-800 loans-----	3. 65	38. 55	0. 05	0. 31

We can conjecture, but we cannot demonstrate, whether the pattern of loan activity displayed here, specifically the findings relating to "*Index Medicus* titles," is brought about by the *Index Medicus* being heavily used as a source in the interlibrary loan operation by the various libraries, or whether the titles selected for inclusion in the *Index Medicus*

TITLES

LOANS

PERCENT OF NLM SERIALS:

PERCENT OF LOANS ACCOUNTED FOR:

ca. 32,650 TITLES
88.25% OF ALL TITLES

(ZERO LOANS)

3,001 TITLES
8.11% OF ALL TITLES

(8,983 LOANS
11.56% OF ALL LOANS)

1,185 TITLES
3.20% OF ALL TITLES

(38,512 LOANS
49.56% OF ALL LOANS)

161 TITLES
0.40% OF ALL TITLES

(30,203 LOANS
38.87% OF ALL LOANS)

PERCENT

PERCENT

FIGURE 7. Total serial titles in NLM and loans

operation, are in fact, the titles which merit prime consideration among libraries.

As we did in the case of libraries, we can present the use of serial titles in another format (table 18). This arrays all titles in terms of the number of loans generated, in descending order. The titles are then arranged in classes of 100 each, such that we obtain complete classes of 100 titles each for our 4,347 titles used. This indicates the relative usage to which successive classes of titles are put, and when cumulated we can observe the increase in the percentage of loans accounted for. We observe, for example, that the most demanded 100 titles (the first class) generates 22,696 loans; the second class accounts for 11,075 loans. We note, too, that the first class of 100 titles accounts for 29.29 percent of all the 77,698 loans, that the first two classes of titles account for 43.46 percent of all the loans.

The arrangement of titles in this form, aside from picturing the specific number of loans sustained and illustrating the cumulated percentages of loans, as we consider classes of titles, is of considerable interest as groundwork for a possible film file based on frequency of requests.

SMALL NUMBER OF SERIAL TITLES, LARGE NUMBER OF LOANS

The use of the NLM serial collection on interlibrary loan provides dramatic confirmation that a relatively small core of serial titles suffices for a relatively large portion of the use. With the small class of serial titles sustaining the lion's share of the loan demand, there exists another class which sustains what we may term moderate use, and a relatively large class of titles sustaining a negligible amount of use. (To these we may add a fourth class which sustains no loans at all.)

When we speak of the small core of serial titles, several ways of presentation confront us. We can state, for example, which percentage of all serial titles in the library sustain what percentage of use or loan activity. In this context, D. J. Urquhart reports that—

In the Science Museum in 1956 about 350 titles accounted for 50 percent of the total use of serials, and about 1,200 titles for 80 percent of the total use. This despite the fact that in 1956 the Science

Museum Library contained 9,120 current serials and possibly an equal number of dead ones.³

This would indicate that 1.91 percent (350 titles) out of the 18,240 titles (approximately) in the Science Museum Library accounts for 50 percent of the demand, and 6.57 percent of the titles account for 80 percent of the use. The NLM figures, in this context, are fairly close. The first 300 titles generated 53.03 percent of the loans; the 300 titles represent 0.8 percent of the 37,000 titles in the NLM collection. The first 9 classes of 100 titles at NLM generated 80.63 percent of the loan use, and these 900 titles comprised 2.43 percent of NLM's serial collection of 37,000 titles.

Again, when we speak of a small group of serial titles sustaining a disproportionate share of use, we may speak of a percentage of titles in terms of the *currently received titles*. Thus, in this context, Frederick G. Kilgour reports⁴ that the Yale University Medical School Library was receiving (in 1961) "1,437 journals published 4 times a year or more often" and, of these, 37 titles, or 2.7 percent of the titles currently received, furnished 49 percent of the recorded use. The NLM figures—estimating the "substantive" serial titles currently received at 6,000—would be that 161 titles, or 2.68 percent of the 6,000 support 38.87 percent of the *total use*. Mr. Urquhart's figures may also be considered within this context, when he speaks of 350 titles out of 9,120 currently received as accounting for 50 percent of the demand. This signifies that 3.83 percent of the currently received titles account for 50 percent of the demand.

Finally, we may speak of the small group of titles and large number of uses in terms of *circulated serial titles*. Here the figures published by Elliott Morse,⁵ illustrating the pattern of loan demand at the Library of the College of Physicians of Philadelphia (during the period November 1957 through October 1958), are of interest. Mr. Morse reports that 1,809 titles

³ Urquhart, D. J., and Bunn, R. M. "A national loan policy for scientific serials." *Journal of Documentation*, vol. 15, p. 21, March 1959.

⁴ Kilgour, Frederick G. Report 1960/61. *Bulletin of the Yale Medical Library*, vol. 20, p. 1, September 1961.

⁵ Morse, Elliott H. "Supply and demand in medical literature." *Journal of the Albert Einstein Medical Center*, vol. 8, p. 285, October 1960.

TABLE 18.—Arrangement of serial titles in classes of 100 each

Class	Number of loans	Cumulated number of loans	Percent of all loans	Cumulated percent of all loans	Cumulated percent of titles
1.....	22,696	22,696	29.29	29.29	2.30
2.....	11,075	33,771	14.25	43.46	4.60
3.....	7,437	41,208	9.57	53.03	6.90
4.....	5,666	46,874	7.29	60.32	9.20
5.....	4,369	51,243	5.62	65.95	11.50
6.....	3,602	54,845	4.63	70.58	13.80
7.....	2,943	57,788	3.78	74.37	16.10
8.....	2,432	60,220	3.13	77.50	18.40
9.....	2,096	62,316	2.69	80.20	20.70
10.....	1,816	64,132	2.33	82.54	23.00
Total.....	64,132		82.54		
11.....	1,574	65,706	2.02	84.56	25.30
12.....	1,378	67,084	1.77	86.33	27.60
13.....	1,202	68,286	1.54	87.88	29.90
14.....	1,039	69,325	1.33	89.22	32.20
15.....	898	70,223	1.15	90.37	34.50
16.....	790	71,013	1.01	91.39	36.80
17.....	700	71,713	.90	92.29	39.10
18.....	611	72,324	.78	93.08	41.40
19.....	546	72,870	.70	93.78	43.70
20.....	500	73,370	.64	94.42	46.00
Total.....	9,238		11.88		
21.....	436	73,806	.56	94.99	48.30
22.....	400	74,206	.51	95.50	50.60
23.....	373	74,579	.48	95.98	52.90
24.....	300	74,879	.38	96.37	55.20
25.....	300	75,179	.38	96.75	57.50
26.....	260	75,439	.33	97.09	59.80
27.....	200	75,639	.25	97.34	62.10
28.....	200	75,839	.25	97.60	64.40
29.....	200	76,039	.25	97.86	66.70
30.....	200	76,239	.25	98.12	69.00
Total.....	2,869		3.69		
31.....	200	76,439	.25	98.37	71.30
32.....	112	76,551	.14	98.52	73.60
33.....	100	76,651	.12	98.65	75.90
34.....	100	76,751	.12	98.78	78.20
35.....	100	76,851	.12	98.90	80.50
36.....	100	76,951	.12	99.03	82.80
37.....	100	77,051	.12	99.16	85.10
38.....	100	77,151	.12	99.29	87.40
39.....	100	77,251	.12	99.42	89.70
40.....	100	77,351	.12	99.55	92.00
Total.....	1,112		1.43		
41.....	100	77,451	.12	99.68	94.30
42.....	100	77,551	.12	99.81	96.60
43.....	100	77,651	.12	99.93	98.90
44.....	47	47	.06	100.00	100.00
Total.....	347	77,698			

circulated, and the most used 100 titles—constituting 5.52 percent of the circulated titles—supplied approximately 50 percent of the demand. The NLM figure here is quite close—300 titles, or 6.90 percent of the 4,347 used during the year of the survey, accounted for 53.03 percent of the loan use.

THE TIME PERIOD OF THE SERIAL TITLES USED

The predominant usage occurred during the most recent decade (1950–59). In fact, when we arrange the loans according to publication date of the serial titles loaned, and then group such an arrangement into decades, we have a situation where there occurs a 50-percent “decay” in loan volume for each successive retrospective decade. This means that if we have 1,000 loans for the most recent decade (in this instance, 1950–59), we would find there occurred 500 loans for the issues of the serial titles published in the immediately preceding decade (1940–49), 250 loans occurring for issues published in the next earlier decade (1930–39), etc.⁶ This is brought out most clearly when we consider the 25 most demanded titles, where this descending exponential expression is most pronounced.

The 25 most demanded titles generated 9,430 loans. Arranged in terms of the decade of the issues of the serial titles loaned, table 19 in its second column shows the pattern of loans.

This is a rather close, if not exact, fit to the 50-percent “falloff” in loans according to the decade of publication of the issues of the serial titles, in this instance the 25 most used in the interlibrary loan operation.

Column 3 indicates what might be expected if we began with 4,694 loans for 1950–59 issues, and there then occurred an exact 50-percent falloff with each decade.

We can examine the behavior of the 300 most used titles, that is to say, the first 3 classes

⁶ This proportion held for serial titles used during October 1961, such that the declining usage of issues of serial titles was in conformance with this pattern of decreasing decade use. Interestingly enough, this held as well for issues of serial titles serviced in the NLM Reading Room, answering another question as well; namely, would a different pattern of usage occur with respect to serial titles used in the Reading Room, than in the interlibrary loan operation?

TABLE 19.—*Loans for the most used 25 serial titles arranged by decade of publication of the titles*

Decade	Loans	Loans expected at “50-percent decay rate”
1950–59-----	4, 694	4, 694
1940–49-----	2, 194	2, 347
1930–39-----	1, 299	1, 173
1920–29-----	526	586
1910–19-----	290	293
1900–09-----	160	147
1890–99-----	63	74
1880–89-----	46	37
1870–79-----	18	18
Pre-1870-----	140	-----
Total-----	9, 430	-----

of titles of 100 each, and indicate what proportions held with respect to the publication date of these serial titles on loan.

These data are supplied in table 20. It is to be noted from our previous finding that these 3 classes of serial titles generated a total of 41,208 loans, or 53.03 percent of all the 77,698 loans. Our data on timespan now tell us that 24,566 of these 41,208 loans pertained to the most recent decade, that is to say, the 300 “top” titles contributed 59.61 percent of their effect with merely the most recent decade of their published issues. We can say this in a different way by asserting that the most recent decade of the 300 “top” titles accounted for 24,566 loans, or 31.61 percent of all the 77,698 loans that were made.

TABLE 20.—*Arrangement of 300 most used serial titles by decade of publication*

Decade	Loans	Cumulated number of loans	Percent of loans	Cumulated percent of loans
1950–59-----	24, 566	24, 566	59. 61	59. 61
1940–49-----	7, 727	32, 293	18. 75	78. 36
1930–39-----	4, 596	36, 889	11. 15	89. 51
1920–29-----	2, 031	38, 920	4. 93	94. 44
1910–19-----	847	39, 767	2. 06	96. 50
1900–09-----	521	40, 288	1. 26	97. 76
Pre-1900-----	920	41, 208	2. 23	100. 00
Total-----	41, 208	-----	100. 00	-----

HOW RAPIDLY DO SERIAL TITLES "AGE"?

We can present an interesting delineation of the number of requests for the top 250 serial titles arrayed according to the number of loans pertaining to the year of publication of the serial titles. This brings about a more precise and exact determination of the timespan analysis than is the case when we speak of the arrangement of loans according to the decade of the publication of the issues of the serial titles loaned.

Table 22 does exactly this. The total number of loans is given for each year of publication, followed by the percentage of the total loans (generated by these 250 titles), followed by an index number.

The index number is used here to illustrate in percentage terms the shift from a certain "standard" of reference or base. In this case we make 1959 the base year. Calendar 1959 was of course the period of our survey, and what we are indicating is the number of loans for 1959 issues of the 250 serial titles here considered. In this context we might regard the 250 serial titles as a single composite title. We consider this number of loans (1,732) as equivalent to the index value of 100, and then plot the loans for 1958 issues in terms of that base value; we do the same for the loans for 1957 issues and so on. Thus we see that, for 1958 issues, our index number becomes 240.93, which is to say that the loans for 1958 issues increased *by* 140.93. It is to be noted that the index value does not descend to under the 100 point until we reach 1953, when our value becomes 94.81. This is to say that loans for 1953 issues are 94.81 percent of the number of loans for 1959 issues.

What this says, by way of illustration, is that the peak loans *for 1961 issues* of serial titles is not reached *during 1961*, but that maximum usage of 1961 issues would occur in 1962 with heavy usage occurring during 1963 and 1964, slightly less heavy usage in 1965 and 1966—but still higher than during 1961—until in 1967 the activity *for 1961 issues* would be slightly under what it was during 1961.

We can place this reasoning in more comprehensible form (table 21).

Thus for Journal Y—let us assume it begins publication during 1961 and is identical in

TABLE 21.—*Hypothetical distribution of loans by date of publication of a serial title*

Year of interlibrary loan activity	Year of publication of Journal Y						
	1961	1962	1963	1964	1965	1966	1967
1961-----	100						
1962-----	240	100					
1963-----	188	240	100				
1964-----	143	188	240	100			
1965-----	124	143	188	240	100		
1966-----	107	124	143	188	240	100	
1967-----	94	107	124	143	188	240	100

demand to our composite of 250 top titles—we would begin with 100 loans for 1961 issues during 1961. During 1962 there would be 240 loans for the 1961 issues (and also 100 loans for 1962 issues). And so on. Note that the vertical column "1961" is exactly what our data for our year of interlibrary loan activity 1959 brings out in the analysis of the year spread for the 250 titles.

The yearly figures are given in table 22.

TABLE 22.—Loans for most demanded 250 serial titles arranged in terms of year of publication using index numbers with 1959 as base year

Year	Loans	Percent	Index No.	Year No.
1959.....	1, 732	4. 73	100. 00	1
1958.....	4, 173	11. 40	240. 93	2
1957.....	3, 257	8. 89	188. 04	3
1956.....	2, 493	6. 81	143. 93	4
1955.....	2, 155	5. 88	124. 42	5
1954.....	1, 856	5. 07	107. 15	6
1953.....	1, 642	4. 48	94. 81	7
1952.....	1, 568	4. 28	90. 53	8
1951.....	1, 325	3. 62	76. 50	9
1950.....	1, 245	3. 40	71. 88	10
1949.....	1, 094	2. 98	63. 16	11
1948.....	904	2. 47	52. 19	12
1947.....	726	1. 98	41. 91	13
1946.....	750	2. 04	43. 30	14
1945.....	579	1. 58	33. 42	15
1944.....	565	1. 54	32. 62	16
1943.....	576	1. 57	33. 25	17
1942.....	577	1. 57	33. 31	18
1941.....	658	1. 79	37. 99	19
1940.....	602	1. 64	34. 75	20
1939.....	549	1. 50	31. 69	21
1938.....	546	1. 49	31. 52	22
1937.....	507	1. 38	29. 72	23
1936.....	452	1. 23	26. 09	24
1935.....	412	1. 12	23. 78	25
1934.....	398	1. 08	22. 97	26
1933.....	366	1. 00	21. 13	27
1932.....	342	. 93	19. 74	28
1931.....	318	. 86	18. 30	29
1930.....	292	. 79	16. 85	30
1929.....	284	. 77	16. 39	31
1928.....	256	. 69	14. 78	32
1927.....	231	. 63	13. 33	33
1926.....	219	. 59	12. 64	34
1925.....	176	. 48	10. 16	35
1924.....	175	. 48	10. 16	36
1923.....	151	. 41	8. 71	37
1922.....	142	. 38	8. 19	38
1921.....	122	. 33	7. 04	39
1920.....	78	. 21	4. 50	40

TABLE 22.—Loans for most demanded 250 serial titles arranged in terms of year of publication using index numbers with 1959 as base year—Continued

Year	Loans	Percent	Index No.	Year No.
1919.....	75	. 20	4. 50	41
1918.....	64	. 17	3. 69	42
1917.....	76	. 20	4. 50	43
1916.....	93	. 25	5. 36	44
1915.....	75	. 20	4. 50	45
1914.....	96	. 26	5. 54	46
1913.....	81	. 22	4. 67	47
1912.....	75	. 20	4. 50	48
1911.....	71	. 19	4. 09	49
1910.....	74	. 20	4. 27	50
1909.....	48	. 13	2. 77	51
1908.....	72	. 19	4. 15	52
1907.....	67	. 18	3. 86	53
1906.....	39	. 10	2. 25	54
1905.....	54	. 14	3. 11	55
1904.....	58	. 15	3. 34	56
1903.....	45	. 12	2. 59	57
1902.....	33	. 09	1. 90	58
1901.....	33	. 09	1. 90	59
1900.....	31	. 08	1. 78	60
Pre-1900.....	830	2. 26	-----	-----
Total.....	-----	100. 00	-----	-----

This tabulation is converted into graphic form in figure 8.

LIST OF 300 MOST USED SERIAL TITLES

The 300 most used serial titles are set forth in table 23, with the number of loans indicated. The country and language of publication are also given, and in the following sections there is an arrangement of these titles and the loans therefor according to country and language of publication. The 300 titles accounted for 41,208 loans out of the total of 77,698 loans, or 53.03 percent of the total.

FIGURE 8. Loans for the most demanded 250 serial titles.

Arrangement is by year of publication showing loans expressed in percentages in terms of the level for 1959 issues of the serial titles, 1959 being assigned the value of 100.

During the "loan year" or base year of 1959 the number of loans for 1959 issues of the 250 serial titles is equated with the index value of 100.

During 1959 the loans for the 1950 issues of the serial titles were: 71.88% of the loans for the 1959 issues.

The loans for the 1940 issues were: 34.75% of the loans for the 1959 issues.

The loans for the 1930 issues were: 16.85% of the loans for the 1959 issues.

The loans for the 1920 issues were: 4.50% of the loans for the 1959 issues.

The loans for the 1910 issues were: 4.27% of the loans for the 1959 issues.

The loans for the 1900 issues were: 1.78% of the loans for the 1959 issues.

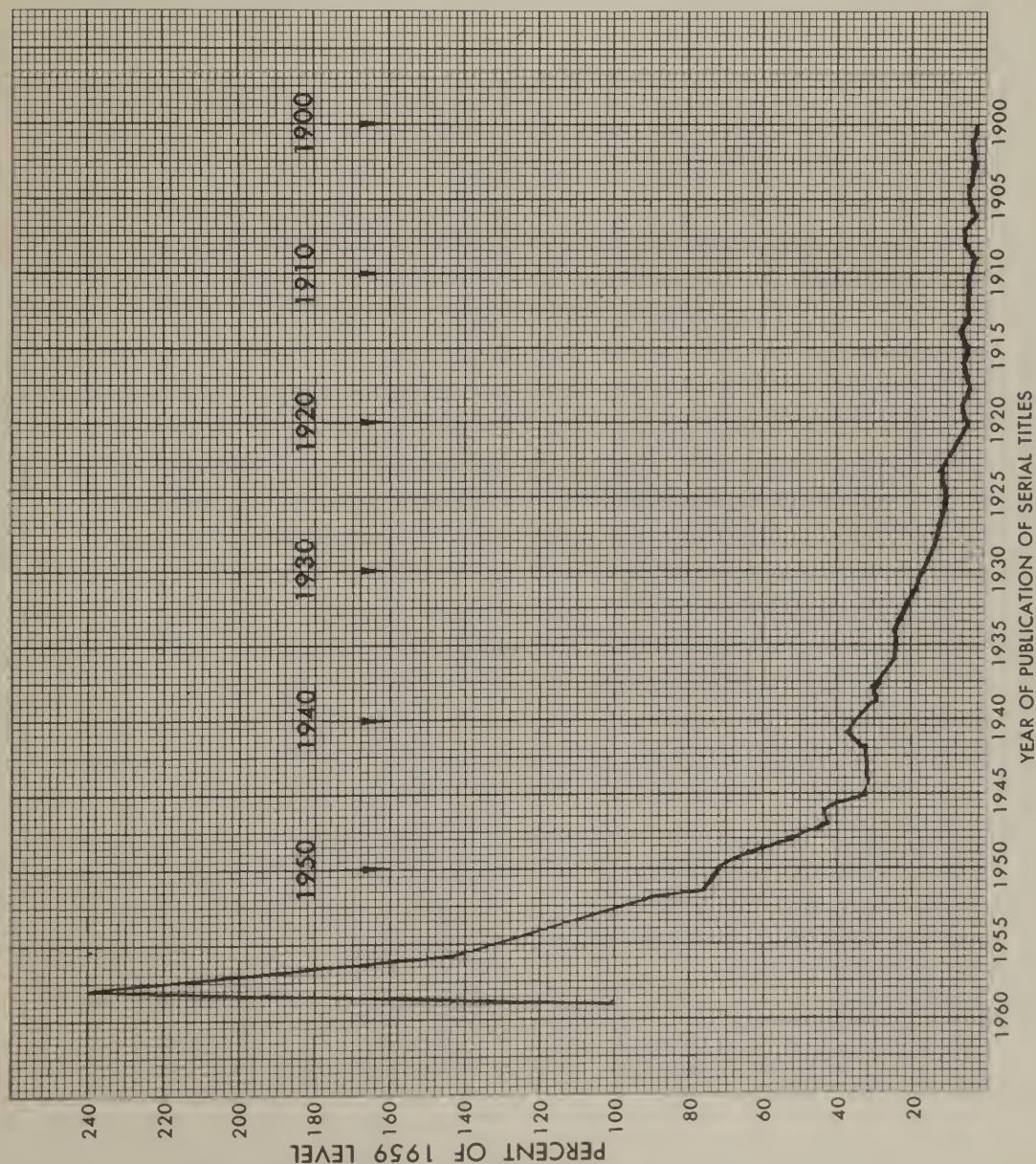


TABLE 23.—*Listing of most demanded serial titles arranged in rank order*
[Language of journals is English unless otherwise indicated]

Rank	Serial title	Number of loans	Country of publication	Language
1	Lancet.....	721	United Kingdom.....	English.
2	British Medical Journal.....	632	do.....	
3	American Journal of Physiology.....	627	United States.....	
4	Journal of the American Medical Association.....	622	do.....	
5	Journal of Biological Chemistry.....	472	do.....	
6	Proceedings of the Society for Experimental Biology and Medicine.....	461	do.....	
7	New England Journal of Medicine.....	455	do.....	
8	Journal of Clinical Investigation.....	407	do.....	
9	Journal of Experimental Medicine.....	381	do.....	
10	Journal of Dental Research.....	368	do.....	
11	Journal of the American Dental Association.....	363	do.....	
12	Science.....	304	do.....	
13	Nature.....	301	United Kingdom.....	
14	Surgery, Gynecology & Obstetrics.....	301	United States.....	
15	New York State Journal of Medicine.....	295	do.....	
16	AMA Archives of Neurology.....	292	do.....	
17	Proceedings of the Royal Society of Medicine.....	289	United Kingdom.....	
18	American Journal of the Medical Sciences.....	284	United States.....	
19	Journal of Laboratory & Clinical Medicine.....	282	do.....	
20	AMA Archives of Internal Medicine.....	270	do.....	
21	Journal of the National Cancer Institute.....	268	do.....	
22	Annals of Surgery.....	264	do.....	
23	Medical Journal of Australia.....	263	Australia.....	
24	Biochemical Journal.....	254	United Kingdom.....	
25	Comptes Rendus des Seances de la Societe de Biologie.....	254	France.....	French.
26	Acta Medica Scandinavica.....	248	Sweden.....	English, French, German.
27	Bollettino della Societa Italiana di Biologia Sperimentale.....	247	Italy.....	
28	American Journal of Orthopsychiatry.....	240	United States.....	Italian.
29	Annals of Internal Medicine.....	240	do.....	
30	Canadian Medical Association Journal.....	237	Canada.....	
31	Journal of Experimental Psychology.....	226	United States.....	
32	Brain; a Journal of Neurology.....	226	United Kingdom.....	
33	Journal of Applied Physiology.....	221	United States.....	
34	American Journal of Obstetrics and Gynecology.....	220	do.....	
35	Journal of Pathology and Bacteriology.....	212	United Kingdom.....	
36	Annals of the New York Academy of Sciences.....	211	United States.....	
37	Anatomical Record.....	210	do.....	
38	Journal of Physiology.....	209	United Kingdom.....	French, German.
39	AMA Archives of Pathology.....	208	United States.....	
40	Journal of Comparative Neurology.....	204	do.....	French.
41	Minerva Medica.....	203	Italy.....	
42	American Journal of Psychiatry.....	202	United States.....	German.
43	Schweizerische Medizinische Wochenschrift.....	199	Switzerland.....	
44	American Journal of Pathology.....	198	United States.....	French.
45	Presse Medicale.....	194	France.....	
46	AMA Archives of Dermatology.....	192	United States.....	German.
47	Klinische Wochenschrift.....	192	Germany.....	
48	American Journal of Clinical Pathology.....	189	United States.....	French.
49	AMA Journal of Diseases of Children.....	187	do.....	
50	Pediatrics.....	187	do.....	French.
51	Medicine.....	186	do.....	
52	Semaine des Hopitaux de Paris.....	185	France.....	French.

TABLE 23.—*Listing of most demanded serial titles arranged in rank order—Continued*
[Language of journals is English unless otherwise indicated]

Rank	Serial title	Number of loans	Country of publication	Language
53	AMA Archives of Surgery.....	181	United States.....	English, French, German.
54	American Journal of Medical Technology....	181	do.....	
55	Acta Allergologica.....	180	Denmark.....	
56	American Journal of Ophthalmology.....	179	United States.....	
57	California Medicine.....	174	do.....	
58	American Journal of Tropical Medicine and Hygiene.	174	do.....	
59	Circulation; Journal of the American Heart Association.	174	do.....	
60	American Journal of Roentgenology, Radium Therapy and Nuclear Medicine.	173	do.....	
61	Journal of Nervous & Mental Disease.....	173	do.....	
62	Bulletin of the Johns Hopkins Hospital....	170	do.....	
63	Journal of Pharmacology & Experimental Therapeutics.	170	do.....	German.
64	Virchows Archiv fur Pathologische Anatomie . . .	169	Germany.....	
65	American Journal of Medicine.....	166	United States.....	
66	Journal of Infectious Diseases.....	166	do.....	
67	Muenchener Medizinische Wochenschrift....	166	Germany.....	German.
68	American Journal of Hygiene.....	164	United States.....	
69	Archives of Disease in Childhood.....	164	United Kingdom....	
70	Journal of Bacteriology.....	163	United States.....	
71	Aerospace Medicine.....	162	do.....	French.
72	Bulletins & Memoires de la Societe Medicale des Hopitaux de Paris.	162	France.....	
73	Journal of Comparative and Physiological Psychology.	161	United States.....	
74	American Journal of Psychology.....	160	do.....	
75	Journal of Anatomy.....	159	United Kingdom....	Dutch.
76	Australasian Annals of Medicine.....	159	Australia.....	
77	Nederlands Tijdschrift voor Geneeskunde....	159	Netherlands.....	
78	Journal of Immunology.....	158	United States.....	
79	Gastroenterology.....	156	do.....	Afrikaans, English.
80	Journal of Mental Science.....	155	United Kingdom....	
81	South African Medical Journal.....	155	Union of South Africa.	
82	Pfluegers Archiv fur die Gesamte Physiologie . . .	154	Germany.....	
83	Quarterly Journal of Medicine.....	154	United Kingdom....	German.
84	Scandinavian Journal of Clinical and Laboratory Investigation.	153	Norway.....	
85	Southern Medical Journal.....	153	United States.....	
86	Deutsche Medizinische Wochenschrift....	153	Germany.....	
87	Journal of Clinical Pathology.....	152	United Kingdom....	Danish, Norwegian, Swedish.
88	British Journal of Experimental Pathology..	151	do.....	
89	Journal of Clinical Endocrinology and Metabolism.	151	United States.....	
90	Nordisk Medicin.....	151	Sweden.....	
91	Endocrinology.....	150	United States.....	
92	Blood; the Journal of Hematology.....	149	do.....	
93	Surgery.....	148	do.....	
94	Cancer.....	147	do.....	
95	Public Health Reports.....	145	do.....	
96	AMA Archives of Ophthalmology.....	144	do.....	

TABLE 23.—*Listing of most demanded serial titles arranged in rank order—Continued*
 [Language of journals is English unless otherwise indicated]

Rank	Serial title	Number of loans	Country of publication	Language
97	Fortschritte auf dem Gebiete der Roentgenstrahlen und der Nuklearmedizin.	144	Germany-----	German.
98	International Journal of Psycho-Analysis----	142	United Kingdom----	
99	Journal of Abnormal and Social Psychology----	142	United States-----	
100	AMA Archives of Otolaryngology-----	141	-----do-----	
101	Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences.	141	France-----	French.
102	Acta Anatomica-----	141	Switzerland-----	English, French, German.
103	Zentralblatt fur Chirurgie-----	140	Germany-----	German.
104	Proceedings of the Royal Society; Series B, Biological Sciences.	140	United Kingdom----	
105	Biochimica et Biophysica Acta-----	139	Netherlands-----	English, French, German.
106	Physiological Reviews-----	139	United States-----	
107	Revue Neurologique-----	138	France-----	French.
108	Semana Medica-----	138	Argentine Republic--	Spanish.
109	Cancer Research-----	137	United States-----	
110	Journal de Physiologie-----	137	France-----	French.
111	Aerztliche Wochenschrift-----	136	Germany-----	German.
112	Journal of Bone and Joint Surgery; American Volume.	136	United States-----	
113	Casopis Lekarů Ceskych-----	135	Czechoslovakia-----	Czechoslovakian.
114	Electroencephalography and Clinical Neurophysiology.	135	Canada-----	
115	Federation Proceedings-----	135	United States-----	
116	Radiology-----	134	-----do-----	
117	Acta Oto-Laryngologica-----	134	Sweden-----	English, French, German.
118	British Journal of Surgery-----	133	United Kingdom----	
119	Medizinische Klinik-----	132	Germany-----	German.
120	British Journal of Radiology-----	130	United Kingdom----	
121	Surgical Forum; Clinical Congress of the American College of Surgeons.	130	United States-----	
122	Laryngoscope-----	128	-----do-----	
123	Acta Radiologica-----	127	Sweden-----	English, French, German.
124	Strahlentherapie-----	127	Germany-----	German.
125	Psychiatry-----	126	United States-----	
126	Zentralblatt fur Gynaekologie-----	126	Germany-----	German.
127	AMA Archives of Industrial Health-----	125	United States-----	
128	Clinical Science-----	124	United Kingdom----	
129	Clinica Chimica Acta-----	124	Netherlands-----	English, French, German.
130	Journal of Chronic Diseases-----	124	United States-----	
131	American Journal of Public Health & the Nation's Health.	123	-----do-----	
132	Annals of Otolaryngology & Laryngology----	123	-----do-----	
133	American Journal of Anatomy-----	122	-----do-----	
134	Journal of Endocrinology-----	122	United Kingdom----	
135	Journal of Laryngology and Otolaryngology-----	121	-----do-----	
136	Acta Physiologica Scandinavica-----	120	Sweden-----	English, French, German.
137	Psychoanalytic Quarterly-----	120	United States-----	
138	Journal of Pediatrics-----	119	-----do-----	
139	American Journal of Surgery-----	118	-----do-----	
140	British Heart Journal-----	118	United Kingdom----	

TABLE 23.—*Listing of most demanded serial titles arranged in rank order—Continued*
 [Language of journals is English unless otherwise indicated]

Rank	Serial title	Number of loans	Country of publication	Language
141	Klinische Monatsblaetter fur Augenheilkunde.	116	Germany-----	German.
142	Naunyn-Schmiedebergs Archiv fur Experimentelle Pathologie.	115	-----do-----	Do.
143	Industrial Medicine & Surgery-----	112	United States-----	Danish.
144	Ugeskrift for Laeger-----	112	Denmark-----	
145	Journal of Parasitology-----	109	United States-----	
146	Journal of the American Chemical Society-----	109	-----do-----	
147	Journal of the Indian Medical Association-----	108	India-----	Spanish. German.
148	Medical Clinics of North America-----	108	United States-----	
149	Prensa Medica Argentina-----	108	Argentine Republic--	
150	Wiener Klinische Wochenschrift-----	108	Austria-----	
151	Canadian Journal of Biochemistry and Physiology.	107	Canada-----	
152	Practitioner-----	106	United Kingdom-----	
153	United States Armed Forces Medical Journal	105	United States-----	
154	Psychosomatic Medicine-----	104	-----do-----	
155	Thorax-----	104	United Kingdom-----	
156	Journal of Neurosurgery-----	104	United States-----	
157	American Journal of Optometry and Archives of American Academy of Optometry.	103	-----do-----	
158	Transactions of the Association of American Physicians.	103	-----do-----	
159	Journal of Obstetrics and Gynaecology of the British Empire.	101	United Kingdom-----	Hungarian.
160	Virginia Medical Monthly-----	101	United States-----	
161	Yale Journal of Biology and Medicine-----	101	-----do-----	
162	Orvosi Hetilap-----	100	Hungary-----	
163	Indian Journal of Medical Research-----	99	India-----	German. English, French, German. French.
164	Medical Services Journal-----	99	Canada-----	
165	Psychological Bulletin-----	99	United States-----	
166	Zeitschrift fur Krebsforschung-----	99	Germany-----	
167	Acta Endocrinologica-----	98	Denmark-----	German.
168	Archives Francaises de Pediatrie-----	98	France-----	
169	Diseases of the Nervous System-----	98	United States-----	
170	Chinese Medical Journal-----	97	China-----	
171	Hoppe-Seyler's Zeitschrift fur Physiologische Chemie.	97	Germany-----	German.
172	Zentralblatt fur Bakteriologie, Parasitenkunde . . .	97	-----do-----	Do.
173	Journal of General Psychology-----	96	United States-----	German. Do. Do.
174	Journal of Neurology, Neurosurgery and Psychiatry.	96	United Kingdom-----	
175	Journal of Hygiene-----	95	-----do-----	
176	Medizinische-----	95	Germany-----	
177	Albrecht von Graefes Archiv fur Ophthalmologie.	95	-----do-----	Dutch, French.
178	Archiv fur Psychiatrie und Nervenkrankheiten.	95	-----do-----	
179	Archives Belges de Medecine Sociale, Hygiene, Medecine du Travail et Medecine Legale.	95	Belgium-----	
180	Plastic and Reconstructive Surgery-----	95	United States-----	
181	Journal of the Mount Sinai Hospital-----	94	-----do-----	
182	Psychiatric Quarterly-----	94	-----do-----	
183	Guy's Hospital Reports-----	93	United Kingdom-----	

TABLE 23.—*Listing of most demanded serial titles arranged in rank order*—Continued
[Language of journals is English unless otherwise indicated]

Rank	Serial title	Number of loans	Country of publication	Language
184	Proceedings of the Staff Meetings of the Mayo Clinic.	93	United States-----	
185	Psychological Review-----	93	-----do-----	
186	Journal of Psychology-----	93	-----do-----	
187	Acta Chirurgica Scandinavica-----	92	Sweden-----	English, French, German.
188	American Heart Journal-----	92	United States-----	
189	International Archives of Allergy and Applied Immunology.	92	Switzerland-----	English, French, German, Spanish.
190	Zeitschrift fur die Gesamte Experimentelle Medizin.	92	Germany-----	German.
191	Revista Clinica Espanola-----	91	Spain-----	Spanish.
192	Zeitschrift fur die Gesamte Innere Medizin und Ihre Grenzgebiete.	91	Germany-----	German.
193	Annales de l'Institut Pasteur-----	90	France-----	French.
194	British Journal of Dermatology-----	90	United Kingdom-----	
195	Deutsche Zeitschrift fur Nervenheilkunde--	90	Germany-----	German.
196	Journal of General Physiology-----	89	United States-----	
197	Minnesota Medicine-----	89	-----do-----	
198	Journal of the Michigan State Medical Society.	88	-----do-----	
199	Quarterly Journal of Studies on Alcohol----	88	-----do-----	
200	Zeitschrift fur die Gesamte Neurologie und Psychiatrie.	87	Germany-----	German.
201	Concours Medical-----	86	France-----	French.
202	Acta Paediatrica-----	86	Sweden-----	
203	Biulleten' Eksperimental'noi Biologii i Meditsiny.	85	Russia-----	Russian.
204	Journal—Lancet-----	85	United States-----	
205	Transactions of the Royal Society of Tropical Medicine & Hygiene.	85	United Kingdom-----	
206	Anesthesiology-----	84	United States-----	
207	British Medical Bulletin-----	84	United Kingdom-----	
208	Experientia-----	84	Switzerland-----	English, French, German.
209	Fiziologicheskii Zhurnal SSSR imeni I. M. Sechenova.	84	Russia-----	Russian.
210	Riforma Medica-----	84	Italy-----	Italian.
211	Transactions of the American Academy of Ophthalmology and Otolaryngology.	84	United States-----	
212	Annales Medico-Psychologiques-----	83	France-----	French.
213	Journal of Cellular & Comparative Physiology--	83	United States-----	
214	Svenska Lakartidningen-----	82	Sweden-----	Swedish.
215	Bulletin de la Societe de Pathologie Exotique--	81	France-----	French.
216	Journal of General Microbiology-----	81	United Kingdom-----	
217	Obstetrics and Gynecology-----	81	United States-----	
218	Edinburgh Medical Journal-----	81	United Kingdom-----	
219	Dermatologica-----	80	Switzerland-----	English, French, German.
220	Journal of Investigative Dermatology-----	80	United States-----	
221	Medical Times-----	80	-----do-----	
222	Neurology-----	80	-----do-----	
223	American Review of Respiratory Diseases-----	79	-----do-----	
224	Helvetica Medica Acta-----	79	Switzerland-----	French, German.
225	Klinicheskaja Meditsina-----	79	Russia-----	Russian.
226	Quarterly Bulletin of Northwestern University Medical School.	79	United States-----	

TABLE 23.—*Listing of most demanded serial titles arranged in rank order—Continued*
[Language of journals is English unless otherwise indicated]

Rank	Serial title	Number of loans	Country of publication	Language
227	Annales Paediatrici.....	78	Switzerland.....	English, French, Ger- man.
228	Biochemische Zeitschrift.....	78	Germany.....	German.
229	Bulletin of the New York Academy of Medi- cine.	78	United States.....	
230	Clinical Chemistry.....	78	do.....	
231	Diabetes.....	78	do.....	
232	Postgraduate Medical Journal.....	78	United Kingdom.....	
233	Zeitschrift fur Kinderheilkunde.....	78	Germany.....	German.
234	Proceedings of the National Academy of Sciences...	78	United States.....	
235	American Journal of Mental Deficiency.....	77	do.....	
236	Archives des Maladies du Coeur et des Vaisseaux.	77	France.....	French.
237	British Journal of Ophthalmology.....	77	United Kingdom.....	
238	Cardiologia.....	77	Switzerland.....	English, French, Ger- man.
239	Postgraduate Medicine.....	77	United States.....	
240	Revue Francaise d'Etudes Cliniques et Biologiques.	77	France.....	French.
241	Acta Neurologica et Psychiatrica Belgica.....	76	Belgium.....	French.
242	Bulletin de la Societe Francaise de Dermatologie et de Syphilographie.	76	France.....	Do.
243	Dia Medico.....	76	Argentine Republic.....	Spanish.
244	Eye, Ear, Nose & Throat Monthly.....	76	United States.....	
245	Journal of Thoracic & Cardiovascular Surgery.	76	do.....	
246	Acta Psychiatrica et Neurologica Scandi- navica.	76	Denmark.....	Danish.
247	Wiener Medizinische Wochenschrift.....	76	Austria.....	German.
248	American Journal of Clinical Nutrition.....	75	United States.....	
249	Journal of Consulting Psychology.....	75	do.....	
250	Modern Hospital.....	75	do.....	
251	Ophthalmologica.....	75	Switzerland.....	English, French, German.
252	Research Publications of the Association for Research in Nervous & Mental Disease.	74	United States.....	
253	Bulletin de l'Academie Nationale de Medecine	74	France.....	French.
254	Bulletin des Societes d'Ophtalmologie de France.	74	do.....	Do.
255	American Surgeon.....	73	United States.....	
256	Bulletin de la Societe de Chimie Biologique.....	73	France.....	French.
257	East African Medical Journal.....	73	Kenya.....	
258	Journal of Genetic Psychology.....	73	United States.....	
259	Northwest Medicine.....	73	do.....	
260	Tohoku Journal of Experimental Medicine.....	73	Japan.....	English, French, German.
261	Zeitschrift fur Klinische Medizin.....	73	Germany.....	German.
262	Acta; Unio Internationalis contra Cancrum.....	72	Belgium.....	English, French.
263	Antibiotiki.....	72	Russia.....	Russian.
264	Archiv fur Gynaekologie.....	71	Germany.....	German.
265	Beitrage zur Pathologischen Anatomie und zur Allgemeinen Pathologie.	71	do.....	Do.
266	Medical Annals of the District of Columbia.....	71	United States.....	
267	Western Journal of Surgery, Obstetrics and Gynecology.	71	do.....	
268	Indian Medical Gazette.....	71	India.....	

TABLE 23.—*Listing of most demanded serial titles arranged in rank order—Continued*
 [Language of journals is English unless otherwise indicated]

Rank	Serial title	Number of loans	Country of publication	Language
269	Pediatric Clinics of North America.....	70	United States.....	
270	Quarterly Journal of Experimental Physiology and Cognate Medical Sciences.	70	United Kingdom.....	
271	Revue de Pathologie Generale et de Physiologie Clinique.	70	France.....	French.
272	Archiv fur Ohren-, Nasen-, und Kehlkopfheilkunde vereinigt mit Zeitschrift fur Hals-, Nasen-, und Ohrenheilkunde.	70	Germany.....	German.
273	Journal of Neuropathology and Experimental Neurology.	70	United States.....	
274	Clinical Research Proceedings.....	70do.....	
275	Zentralblatt fur Allgemeine Pathologie und Pathologische Anatomie.	69	Germany.....	German.
276	Archives Internationales de Pharmacodynamie et de Therapie.	69	Belgium.....	English, French, German, Italian, Spanish.
277	Acta Societatis Medicorum Upsaliensis.....	69	Sweden.....	English, French, German.
278	Anesthesia and Analgesia; Current Researches.	69	United States.....	
279	Minerva Dermatologica.....	68	Italy.....	Italian.
280	New Zealand Medical Journal.....	68	New Zealand.....	
281	U.S. Air Force, School of Aviation Medicine. Project report.	68	United States.....	
282	Arzneimittel-Forschung.....	68	Germany.....	German.
283	Journal of Industrial Hygiene and Toxicology.	68	United States.....	
284	Ohio State Medical Journal.....	67do.....	
285	Pediatric.....	67	France.....	French.
286	Schweizerische Zeitschrift fur Allgemeine Pathologie und Bakteriologie.	67	Switzerland.....	English, French, German.
287	Texas State Journal of Medicine.....	67	United States.....	
288	Voenno-Meditsinskii Zhurnal.....	67	Russia.....	Russian.
289	Connecticut Medicine.....	67	United States.....	
290	Polski Tygodnik Lekarski.....	66	Poland.....	Polish.
291	Surgical Clinics of North America.....	66	United States.....	
292	Zeitschrift fur Zellforschung und Mikroskopische Anatomie.	66	Germany.....	German.
293	Archives of Biochemistry and Biophysics.....	66	United States.....	
294	Acta Physiologica Academiae Scientiarum Hungaricae.	66	Hungary.....	English, French, German, Russian.
295	British Journal of Industrial Medicine.....	66	United Kingdom.....	
296	Bulletin of the World Health Organization..	66	Switzerland.....	English, French.
297	Illinois Medical Journal.....	66	United States.....	
298	Journal of the American Geriatrics Society..	66do.....	
299	Journal of the American Veterinary Medical Association.	66	United States.....	
300	Minerva Pediatrica.....	65	Italy.....	Italian.

THE COUNTRY AND LANGUAGE OF PUBLICATION OF THE SERIAL TITLES

The 300 most demanded titles exhibit the following pattern with respect to country of publication. (The 300 titles generated 41,208 loans.)

TABLE 24.—Arrangement of 300 most demanded titles by country

Country of publication	Titles	Loans
United States.....	145	22, 141
United Kingdom.....	37	6, 116
Germany.....	32	3, 452
France.....	20	2, 237
Switzerland.....	11	1, 038
Sweden.....	9	1, 109
Italy.....	5	667
Russia.....	5	387
Belgium.....	4	312
Canada.....	4	578
Denmark.....	4	466
Argentine Republic.....	3	322
India.....	3	278
Netherlands.....	3	422
Australia.....	2	422
Austria.....	2	184
Hungary.....	2	166
China.....	1	97
Czechoslovakia.....	1	135
Japan.....	1	73
Kenya.....	1	73
New Zealand.....	1	68
Norway.....	1	153
Poland.....	1	66
Spain.....	1	91
Union of South Africa.....	1	155
Total.....	300	41, 208

Thus, 48.33 percent of the titles are published in the United States, 12.33 percent are published in the United Kingdom, 10.66 percent are published in Germany, and 6.66 percent in France. All others account for 22 percent.

With respect to loans, 53.72 percent relate to serial titles published in the United States, 14.84 percent to titles published in the United Kingdom, 8.37 percent to titles published in Germany, and 5.42 percent to titles published in

TABLE 25.—Arrangement of 300 most demanded titles by language

Language of publication	Titles	Loans
English.....	196	30, 012
German.....	34	3, 636
French.....	21	2, 313
Italian.....	5	667
Russian.....	5	387
Spanish.....	4	413
Danish.....	2	188
Czech.....	1	135
Dutch.....	1	159
Hungarian.....	1	100
Polish.....	1	66
Swedish.....	1	82
English-French-German.....	18	2, 006
French-German.....	2	278
English-French.....	2	138
Afrikaans-English.....	1	155
Danish-Norwegian-Swedish.....	1	151
English-French-German-Spanish.....	1	92
English - French - German - Italian-Spanish.....	1	69
English-French-German-Russian.....	1	66
Dutch-French.....	1	95
Total.....	300	41, 208

France, with loans from titles published in all other countries amounting to 17.65 percent.

The breakdown by language is set forth in table 25.

Here we find that 65.33 percent of the titles are in the English language, with 11.33 percent in German, and 7.00 percent in French; if we combine these we have 83.66 percent of the titles; further, if we add in the 22 titles which are published in the three languages we obtain a percentage of 91 percent of the 300 titles which cover English, French, German. Italian language serial titles represent 1.66 percent of the 300 titles, as do Russian language titles, with 1.33 percent of the titles being represented by the Spanish language.

With respect to loans, we find 72.83 percent relate to English language material (articles), 8.82 percent to German language articles, 5.61 percent to French language articles. Another 4.86 percent of the loans cover multilingual serial titles (English, German, French). Thus a total of 92.12 percent of the loans are for articles

in the composite language group, English, German, French.

COMPARISON WITH OTHER RANK ORDER LISTS

The previous listing of 300 most demanded serial titles occasions a question relating to its relationship to other rank order lists.

From an earlier 3-month survey made at NLM in 1958, we have one such listing; there is the list of the Mayo Clinic Library;⁷ we have, too, the list of the College of Physicians Library, Philadelphia;⁸ and that of the Yale University

⁷ Keys, Thomas E. "Top journal circulation of unbound issues for 1954-1956 in the Mayo Clinic Library." *In his* Applied Medical Library Practice. Springfield, Ill., Thomas, 1958. p. 389-93.

⁸ Morse, Elliott H. Annual report on the Library: Administrative; 1 November 1952-31 October 1953. Transactions & Studies of the College of Physicians of Philadelphia, 4 ser., vol. 21, p. 140-141, April, 1954.

Medical Library.⁹ While no exhaustive comparison is possible here, the 25 most demanded titles in each list may be analyzed. Such comparison is not precise for several reasons, including varying criteria, e.g., the Mayo list is directed to unbound issues, and the Yale listing to journals of the period 1956-60. However, we can profitably indicate in broad terms the nature of this comparison.

Table 26 which follows lists the top 25 titles in our main survey; to this is added the rank number which each of these 25 titles received in the respective listing. (In the case of ties, the rank order is averaged, and the number in parentheses indicates the number of journal titles involved in the tie.)

⁹ Kilgour, Frederick G. "Use of medical and biological journals in the Yale Medical Library." To be published.

TABLE 26.—Rank of the most demanded 25 serial titles in NLM survey in terms of the original surveys indicated.

Serial title	Rank in present survey	NLM 1958 survey	Yale	Mayo	College of Physicians, Philadelphia
Lancet.....	1	1	2	8	5
Brit Med J.....	2	2	6	15	7
Amer J Physiol.....	3	4	8	41. 5 (2)	3
JAMA.....	4	3	4	1	1
J Biol Chem.....	5	9	1	62	2
Proc Soc Exp Biol Med.....	6	6	18. 5 (4)	37. 5 (2)	4
New Engl J Med.....	7	32 (3)	11. 5 (2)	2	15
J Clin Invest.....	8	11	15. 5 (2)	16	6
J Exp Med.....	9	43. 5 (4)	77 (19)	75. 5 (2)	31
J Dent Res.....	10	186 (3)	-----	-----	-----
J Amer Dent Ass.....	11	129 (9)	-----	-----	-----
Science.....	12	19 (3)	7	37. 5 (2)	19
Nature (Lond).....	13. 5 (2)	61	11. 5 (2)	66. 5 (2)	14
Surg Gynece Obstet.....	13. 5 (2)	19 (3)	77 (19)	3	11
New York J Med.....	15	32 (3)	165 (35)	61	28
AMA Arch Neurol.....	16	71. 5 (8)	125. 5 (44)	32. 5 (2)	40
Proc Roy Soc Med.....	17	13. 5 (2)	35 (5)	35	36
Amer J Med Sci.....	18	57 (7)	95. 5 (18)	22	10
J Lab Clin Med.....	19	36. 5 (2)	77 (19)	24	17
AMA Arch Intern Med.....	20	50 (7)	22. 5 (4)	6	22
J Nat Cancer Inst.....	21	201. 5 (4)	31. 5 (2)	189 (19)	-----
Ann Surg.....	22	22 (3)	46. 5 (8)	5	8
Med J Aust.....	23	12	95. 5 (18)	71	-----
Biochem J.....	24	13. 5 (2)	35 (5)	129 (7)	9
C R Soc Biol (Par).....	25	5	77 (19)	121 (9)	20

We note there are only 4 titles which are common to the five lists within the 25-title limitation. This is indicated below; the number indicates the ranking in the respective listing.

TABLE 27.—*Serial titles common to all 5 rank order lists*

Titles	NLM (main survey)	NLM (1958 survey)	Yale	Mayo	College of Physicians Library, Philadelphia
Lancet.....	1	1	3	8	5
British Medical Journal.....	2	2	13	15	7
Journal of the American Medical Association.....	4	3	2	1	1
Journal of Clinical Investigation.....	8	11	14	16	6

VI

Findings and Analysis: Libraries and Serial Titles, Interrelationships

RELATIONSHIP BETWEEN THE MOST HEAVILY USED SERIAL TITLES AND THE LARGEST LIBRARY USERS

What sort of relationship holds with respect to the serial titles which account for the largest number of loans and the libraries accounting for the greatest number of loans?

We can conveniently use data on the most used 25 serial titles which generated 9,430 loans and the 25 libraries, responsible for the heaviest volume of use, 22,016 loans. We can outline the representation of the 25 libraries in the loans sustained by the 25 titles. We may approach the problem with the question: Is any one library represented in the loans sustained by the 25 titles, more or less than the percentage that library's loans is of the entire total of loans (77,698)? The determination of relatively major or minor use of the 25 serial titles can be made from the standpoint of calculating the percentage in which one library is represented in the total requests: e.g., Library No. 1 received 2,105 loans out of the total of 77,698 loans. This is 2.7 percent. Applying 2.7 percent to the 9,430 loans for the top 25 titles, we obtain 254. This is to say that we *might* expect Library No. 1 to be represented in the 25 titles' loans by 254 loans. This procedure serves, at least, to bring out whether the representation of one library in the 25 titles is less than or more than its percentage representation in the entire loan total.

Upon examination of the data, it turns out that Library No. 1 is represented by a total of 32 loans in the 9,430 loans for the 25 top titles. This is well under the 254 "expected" and

indicates simply that Library No. 1's representation in the 25 titles was less than its representation in the entire loan total as a whole, and that it is using the 25 titles proportionately less than it is using titles other than the top 25. Another library, Library No. 13, accounted for 652 loans. This is 0.83 percent of the 77,698 loans. Applying 0.83 percent against the 9,430 loans for the top 25 titles, we obtain 78. This is the expected total. Library No. 13, in fact, received 149 loans, thus displaying a higher representation in the 25 titles than in the total loans as a whole. The question of "why" such use of the 25 titles occurs is then subject to evaluation on the basis of several criteria.

What of the 25 libraries as a class? They represent in their 22,016 loans, 28.33 percent of the grand total of the 77,698 loans. We might expect them as a class to be represented in the loans for the 25 top titles by this same 28.33 percent, or by 2,643 of the 9,430 loans. Actually, the 25 libraries received 3,203 loans for the 25 titles, or somewhat over the expected 2,643. This method of calculation is merely the first step in an analysis which would have to take into account the type of library, its location, type of program, collection, etc.

Table 28 organizes these data in the format described.

An added consideration in the relationship between heavy library use and heavy serial title use is the question of the time period of the serial titles loaned.

What portion of the loans, for example, related to the most recent decade of publication for our 25 titles?

This relationship vis-a-vis libraries and titles, together with the arrangement of the loans

TABLE 28.—*Relationship of large-scale library users to most loaned serial titles*

Library rank	Type	Location	Number of loans	Percent of all loans	Number of loans relating to 25 top titles	Number of loans "expected" for 25 top titles
1-----	U.S. Government—PHS-----	U.S. (D.C.)-----	2, 105	2. 70	32	254
2-----	Industrial, research-----	U.S.-----	1, 910	2. 45	122	230
3-----	U.S. Government—Army-----	U.S. (D.C.)-----	1, 798	2. 31	129	217
4-----	do-----	U.S. (D.C.)-----	1, 416	1. 82	286	171
5-----	Hospital-----	U.S.-----	1, 328	1. 70	309	159
6-----	Medical school-----	U.S. (D.C.)-----	1, 298	1. 67	36	157
7-----	Nonmedical-----	Foreign-----	1, 134	1. 45	53	136
8-----	U.S. Government non-medical-----	U.S. (D.C.)-----	862	1. 10	283	103
9-----	Medical school-----	Foreign-----	825	1. 06	54	99
10-----	Hospital-----	U.S. (D.C.)-----	793	1. 02	134	95
11-----	U.S. Government—Air Force-----	U.S.-----	739	. 95	97	89
12-----	do-----	U.S.-----	656	. 84	163	79
13-----	Hospital-----	U.S. (D.C.)-----	652	. 83	149	78
14-----	U.S. Government—Navy-----	U.S.-----	601	. 77	286	72
15-----	do-----	Foreign-----	590	. 75	123	70
16-----	U.S. Government—Army-----	U.S. (D.C.)-----	584	. 75	173	70
17-----	Medical school-----	Foreign-----	566	. 72	38	67
18-----	U.S. Government—non-medical-----	U.S.-----	564	. 72	171	67
19-----	U.S. Government—Army-----	Foreign-----	548	. 70	175	65
20-----	Hospital-----	U.S. (D.C.)-----	547	. 70	98	65
21-----	U.S. Government—Air Force-----	U.S. (D.C.)-----	525	. 67	106	63
22-----	U.S. Government—Army-----	U.S. (D.C.)-----	521	. 67	40	63
23-----	U.S. Government—Veterans' Administration-----	U.S. (D.C.)-----	494	. 63	40	59
24-----	U.S. Government—Army-----	U.S. (D.C.)-----	492	. 63	106	59
25-----	Medical school-----	U.S.-----	468	. 60	0	56
Total-----	-----	-----	22, 016	-----	3, 203	2, 643

according to the decade of publication of the serial titles, is presented in table 29.

We note here that the percentage of loans covering the most recent decade of publication was especially high for Libraries 5, 8, 13, 18, and 20. These findings become less disturbing when it is considered that two of these libraries are nonmedical and the others are hospital libraries.

RELATIONSHIP BETWEEN LIBRARIES AND TITLES WITH RESPECT TO LOANS ACCOUNTED FOR

An interesting picture emerges when we consider the 1,780 libraries and the 4,347 titles with respect to the 77,698 loans accounted for. We had arranged both libraries and titles in classes of 100 each, in descending order such that the first class of titles (and the first class of libraries) displayed the highest number

TABLE 29.—*Relationship between 25 heaviest library users and 25 most used titles according to decade of publication of serial titles*

Rank	1950-59	Percentage of loans relating to 1950-59	1940-49	1930-39	1920-29	1910-19	1900-09	pre-1900	Undated
1.....	12	37.5	4	0	2	6	4	4	0
2.....	35	28.6	37	24	11	10	2	3	0
3.....	36	27.9	17	28	21	16	9	2	0
4.....	57	19.9	73	121	19	8	2	4	2
5.....	222	71.8	50	32	4	0	0	0	1
6.....	6	16.6	2	8	3	8	7	2	0
7.....	10	18.8	9	12	3	8	8	2	1
8.....	212	74.9	42	17	9	2	0	0	1
9.....	7	12.9	7	9	13	6	6	5	1
10.....	49	36.5	37	24	11	6	1	5	1
11.....	40	41.2	17	12	9	10	2	6	1
12.....	65	39.8	60	25	8	5	0	0	0
13.....	92	61.7	28	22	4	2	0	0	1
14.....	119	41.6	104	47	7	4	0	4	1
15.....	53	43.0	53	15	2	0	0	0	0
16.....	88	50.8	52	26	4	0	1	0	2
17.....	18	47.3	9	9	1	1	0	0	0
18.....	120	70.1	35	13	3	0	0	0	0
19.....	56	32.0	80	24	7	7	0	0	1
20.....	63	64.2	19	9	3	1	2	1	0
21.....	63	59.4	19	9	7	7	0	1	0
22.....	4	10.0	2	8	5	5	9	7	0
23.....	7	17.5	11	14	6	2	0	0	0
24.....	30	28.3	12	12	17	15	10	10	0
25.....	0	0	0	0	0	0	0	0	0
Totals...	1,464	45.7	779	520	179	129	63	56	13

of loans, and the second class accounted for the next highest total of loans. If we compare the data (from table 4 and table 18), we note that the first class of 100 libraries accounted for 41,726 loans, and that the first class of 100 titles accounted for, or sustained, 22,696 loans. If we continue to match our loans with reference to successive classes of libraries and titles of 100 each, we find disparity. However, if we consider classes of 100 libraries, and classes of 300 titles, we find the close agreement displayed in table 30. Again, we have the first class of libraries representing the 100 libraries accounting for the most loans, and the second class of libraries accounting for the next highest number of loans, etc. For the titles we do the same thing, except that we consider successive classes of 300 titles each. The table

is not cumulative but supplies the specific totals of loans accounted for by the classes of 100 libraries and the classes of 300 titles.

This agreement in loans accounted for by successive classes of 100 libraries and 300 titles is close and is of interest for the pattern and relationship exhibited. When we array titles and libraries in descending order according to number of loans accounted for, then gather them into classes of 300 and 100, respectively, the loans accounted for by the separate classes is remarkably similar in the "decline" in use.

Table 31 organizes our data into *cumulated* form; we can observe here the close approximation in the cumulated percentage of loans accounted for when we examine classes of titles and classes of libraries, and the somewhat less precise agreement between percentages of libraries and percentages of titles.

TABLE 30.—*Relationship between titles and libraries in terms of loans accounted for*

Libraries (classes of 100 each)	Loans accounted for	Titles (classes of 300 each)	Loans accounted for
1.....	41,726	1	41,208
2.....	12,211	2	13,899
3.....	7,254	3	7,545
4.....	4,581	4	4,705
5.....	3,200	5	3,079
6.....	2,206	6	2,041
7.....	1,603	7	1,462
8.....	1,229	8	1,054
9.....	936	9	755
10.....	716	10	600
11.....	556	11	375
12.....	434	12	300
13.....	332	13	300
14.....	253	14	300
15.....	189	-----	75
16.....	100	-----	-----
17.....	100	-----	-----
	80	-----	-----
Total.....	77,698	-----	77,698
1,780 libraries arranged in classes of 100 libraries each.		4,347 titles arranged in classes of 300 each.	

TABLE 31.—*Relationship between cumulated percentages of libraries and cumulated percentages of loans; cumulated percentages of titles and cumulated percentages of loans*

Libraries (classes of 100 each)	Percent of libraries	Cumulated percent of libraries	Percent loans accounted for	Cumulated loans accounted for	Titles (classes of 300 each)	Percent of titles	Cumulated percent of titles	Percent loans accounted for	Cumulated loans accounted for
1.....	5.61	5.61	53.70	53.70	1.....	6.90	6.90	53.03	53.03
2.....	5.61	11.23	15.71	69.41	2.....	6.90	13.80	17.55	70.58
3.....	5.61	16.85	9.33	78.75	3.....	6.90	20.70	9.61	80.20
4.....	5.61	22.47	5.89	84.65	4.....	6.90	27.60	6.13	86.33
5.....	5.61	28.08	4.11	88.76	5.....	6.90	34.50	4.04	90.37
6.....	5.61	33.70	2.83	91.60	6.....	6.90	41.40	2.70	93.08
7.....	5.61	39.32	2.06	93.67	7.....	6.90	48.30	1.90	94.99
8.....	5.61	44.94	1.58	95.25	8.....	6.90	55.20	1.38	96.37
9.....	5.61	50.56	1.20	96.45	9.....	6.90	62.10	.97	97.34
10.....	5.61	56.17	.92	97.37	10.....	6.90	69.00	.77	98.12
11.....	5.61	61.79	.71	98.09	11.....	6.90	75.90	.53	98.65
12.....	5.61	67.41	.55	98.65	12.....	6.90	82.80	.38	99.03
13.....	5.61	73.03	.42	99.08	13.....	6.90	89.70	.38	99.42
14.....	5.61	78.65	.32	99.40	14.....	6.90	96.60	.38	99.81
15.....	5.61	84.26	.24	99.64	15.....	3.40	100.00	.18	100.00
16.....	5.61	89.88	.12	99.77	Total.....			100.00	-----
17.....	5.61	95.50	.12	99.90				-----	-----
18.....	4.50	100.00	.09	100.00				-----	-----

VII

Summary and Conclusions

DESCRIPTIVE

A large amount of data have been explored in the present survey, and additional investigation can profitably be managed. The main avenues or highlights have been examined, some in detail, and the characteristics of the library clientele have been set forth in terms of extent of use, geographic location, and the types of libraries. For the serial titles, parallel data have been developed and presented; here we have set down the extent of the titles demanded on loan, something of their characteristics, loan demand, and the part played by the year of publication of the serial titles used in the interlibrary loan program.

Substantial usage was found to be centered in a relatively small group of libraries, with rapidly declining usage when we considered the remaining groups of libraries. A somewhat parallel pattern was found to prevail with respect to the serial titles, a small increment of NLM's total serials (even a small increment of the titles used in the interlibrary loan operation) sustaining a large percentage of the loan use. Large-scale concentration of usage on recent years' output was ascertained. A close and interesting relationship was found to prevail, in fact, between increments of libraries and increments of titles, with respect to loans accounted for.

The heavy concentration of loan use—in percentage terms—in the metropolitan area of the District of Columbia was also noted. However, in terms of absolute numbers the distribution of loans on a national scale, even though limited in percentage terms, was indisputably on a substantial basis.

THE FINDINGS SUMMARIZED IN TERMS OF 1,000 LOANS AS REPRESENTATIVE OF THE SURVEY

One convenient manner in which to summarize our findings is to portray our results in terms of 1,000 "loans," assuming these 1,000 to be precisely representative of the total number of loans. This manner of presentation may be conceived to be in the form of a response to the question: "How can we describe the characteristics and distribution of 1,000 loans?"

We could describe our 1,000 loans in terms of the following:

A. LIBRARIES—Loan consumption:

(1) 47 loans would be accounted for by libraries in the "Low Use" category (libraries receiving from 1 to 10 loans in the course of a year).

(2) 291 loans would be accounted for by libraries in the "Moderate Use" category (libraries receiving from 11 to 100 loans).

(3) 662 loans would be accounted for by libraries in the "Heavy Use" category (libraries receiving 101 or more loans).

B. LIBRARIES—Worldwide geographic location and loans accounted for—

In terms of geographic location of the libraries receiving the 1,000 loans, we would find—

(1) 787 loans would be distributed within the United States.

(2) 63 loans would be distributed to U.S. Government libraries overseas.

(3) 150 loans would be distributed to foreign libraries.

C. LIBRARIES—Geographic location within the United States:

If we conceive of the 1,000 loans as distributed within the United States, we would find the following distribution in terms of census regions:

Census region	Loans
South Atlantic: (Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida)-----	510
Metropolitan area of the District of Columbia-----	(303)
Middle Atlantic: (New York, New Jersey, Pennsylvania)-----	149
East North Central: (Ohio, Indiana, Illinois, Michigan, Wisconsin)-----	104
West South Central: (Arkansas, Louisiana, Oklahoma, Texas)-----	51
New England: (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut)-----	49
West North Central: (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas)-----	40
East South Central: (Kentucky, Tennessee, Alabama, Mississippi)-----	35
Pacific: (Washington, Oregon, California, Alaska, Hawaii)-----	30
Mountain: (Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada)---	26
Outlying parts of the United States-----	6
Total-----	1, 000

D. LIBRARIES—Types of libraries and loans accounted for:

Our 1,000 loans would be distributed in the United States to the following types or kinds of libraries:

Federal Government medical libraries-----	333
Hospital libraries-----	206
Medical school libraries-----	135
Industrial research, and foundation libraries----	126
Federal Government nonmedical libraries-----	83
College and university libraries-----	41
Medical society libraries-----	35
Public libraries-----	24
Other medical libraries-----	10
Other libraries-----	7
Total-----	1, 000

E. SERIAL TITLES—Loan activity:

(1) 116 loans would be accounted for by serial titles in the "Low Use" category (that is, titles generating 1 to 10 loans in the course of a year).

(2) 496 loans would be accounted for by serial titles in the "Moderate Use" category (titles generating 11 to 100 loans).

(3) 389 loans would be accounted for by serial titles in the "Heavy Use" category (101 and more loans).

F. SERIAL TITLES—Relationship to *Index Medicus* listing:

(1) 822 loans would be for titles listed in *Index Medicus*.

(2) 178 loans would be for other titles.

G. SERIAL TITLES—The time period of the serials loaned:

(1) 596 loans would relate to the most recent decade (1950–59) of publication.

(2) 187 loans would relate to the decade 1940–49.

(3) 112 loans would relate to 1930–39.

(4) 49 loans would relate to 1920–29.

(5) 56 loans would relate to prior decades.

INTERPRETATION AND ANALYSIS

Some analysis of the significance of the data has been set forth with relation to serial titles, libraries, and the relationship between them. This has been on a limited order, in the form of outline, rather than in the sense of precise or detailed investigation as to the significance of the findings. More detailed analysis remains to be made along selected lines with reference to the extent and nature of the loan pattern.

Our findings can be briefly inspected, however, from the standpoint of the mission and role of the NLM. Basically, this role may be termed complementary, in the interlibrary loan sphere, to the medical library resources across the country, with the qualification that important responsibilities exist to service a number of libraries in the metropolitan area of the District of Columbia, principally Federal Government libraries. An extension of this responsibility exists with reference to adjuncts of such Federal Government libraries located overseas. Together, these two areas of service comprise a demand which would represent using NLM as a "regional library."

Our data certainly indicate that the program is successfully meeting a large number of loan needs across the country. We do not know nor can we measure the bona fide demand that exists but which has not been translated into loan requests.

We can, in another direction, state that a great many requests for loans concern relatively common titles. This observation has to be

tempered by the observation that the factors of library location, nature of the collections, and the time period of the serial titles, are valid considerations within the group of common titles. (Many small libraries may not have access to the common titles, especially when we consider retrospective holdings.)

With respect to internal management, there are a number of findings which may be summarized here together with the outline of the analysis directed toward those findings. Even with lessening concentration on a "core" of serial titles, a more effective graphic storage and retrieval system becomes worthy of serious consideration. This is to say that a class of serial titles with emphasis on recent years of holdings might constitute an area for miniaturization. With preponderant demand for such a class of titles, for recent years, the present system of handling each volume, *de novo*, each time a loan request is received is open to question.

The centralization of loans on serial titles of recent years has already directed attention and decision toward the organization of the Library's serial collection on the basis of time period. In the Library's new building the serial collection will be split such that serial titles published 1946 to date will be shelved separately (on Level A) providing convenient and effective access. This will provide the collection necessary to handle 7 out of 10 interlibrary loan requests for serial titles. The separate storage of the serial titles published from 1946 to date will eliminate much of the time spent in locating and replacing volumes needed, contrasted with the discarded alternative of spreading the

entire collection over a large horizontal area. Serial titles published prior to 1946 will be shelved on Level C. This segregation of serial titles will be entirely on the basis of time period, and will not take into account specific serial titles. (The prediction of high level use on a title-by-title basis is hazardous and subject to change from year to year, evidenced by the popularity ranking of titles in the earlier NLM studies and the present one.)

It was noted that the overwhelming percentage of serial titles supplied on loan were titles indexed in the *Index Medicus*. The findings in the survey with relation to specific titles in the *Index Medicus* list which sustained no loans or very few loans, and also those non-*Index Medicus* titles which sustained moderate use, will be useful as an aid, in combination with other considerations, in reviewing additions to the indexing operations.

Much of the discussion and quantification has turned on large-scale use and the inference may be drawn that the serial titles of low use may assume a devaluation in proportion to their low use. However, the fact that Journal X sustains but 1 or 2 uses during the year does not minimize its importance to the user. Journal X may be an especially uncommon title, and its loan takes on an importance far beyond the number of times it may be requested. The presentation of the statistics should not obscure this character of interlibrary loan operation, since the loans provided on the serial titles of relatively low use may satisfy a need of greater value to the medical library community than the titles which undergo several times that usage.

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